SRAC Publication No. 322

Southern
Regional
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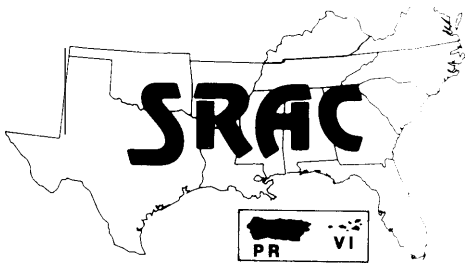
Center



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Red Drum

Production of Food Fish

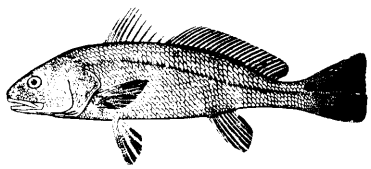
James T. Davis*

Production of food sized red drum is now being practiced using two methods. The more conventional method is semi-intensive culture in ponds. The other method, intensive indoor raceway culture, is unproven from an economic standpoint. This series of publications will focus on pond production. For more detailed information on red drum production consult the other fact sheets in this series or the revised *Manual for Red Drum Aquaculture* published by the Texas Agricultural Extension Service in 1990.

Overwintering

The major factor affecting the commercial production of food sized red drum in outdoor ponds is their normal growth rate. Twelve months (two growing seasons) are needed for the fish to reach marketable size. This means that fish will have to be overwintered. The cold weather in December of 1989 killed most red drum in outdoor ponds. The only survivors were in reservoirs or tanks receiving a constant supply of warm water.

The following discussion is based on successes to date. The occurrence of critically low temperature of the water will determine the success of pond culture of red drum in the future.



Redfish (Sciaenops ocellata)

Stocking

Most fingerling red drum are stocked into ponds for growout at a rate of 2,000 to 4,000 per acre. The higher rate may be attempted where good quality saline water is readily available and experience indicates probable success. Water quality and pond depths are discussed in SRAC Publication No. 321, *Red Drum: Site Selection and Pond Construction.* Ponds should be filled at least 1 week but not more than 2 weeks before stocking fingerlings less than 2 inches in length. The water should be fertilized when entering the pond. The amount and analysis of the fertilizer will vary. Good results are obtained with one gallon of liquid 10-34-0 fertilizer per acre added when water is 1 foot deep. A second gallon per acre is then added when the pond is full. Further fertilization usually is not required as uneaten feed and fecal material will adequately fertilize the water when feeding starts.

A recent development in starting these small fingerlings is copied from the catfish industry. Fingerlings are placed in the pond as soon as the water depth reaches 1 foot. Water is then added to the pond at a rate of 6 inches per day, and the fish are fed three times daily. The shallow depth enables the fish to find the feed more readily.

When stocking fish more than 6 inches in length, ponds should be fertilized if a suitable plankton population does not develop within 2 weeks. Plankton population should be dense enough that light penetration does not exceed 3 feet.

The date of stocking can vary but should be set as soon as pond water reaches 50°F. Red drum will feed at this temperature and can survive at temperatures 5 or 6ºF lower if a cool front passes.

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Feeds and feeding

Opinions differ on the best feed for fingerling red drum. Based on field trials to date, a floating pellet containing 35 percent protein is an economical feed that provides good growth. Feeds should have at least 12 percent fish meal, and the addition of shrimp head meal tends to improve palatability. Other ingredients are usually soybean meal, ground yellow corn, a vitamin premix and minerals.

Pellet size must be small enough to be swallowed. If the pellets are too large, fish will not utilize the feed well. If the pellets are too small, or a meal feed is used, then much will be lost on the bottom of the pond. Do not change the type or size of feed suddenly. Fish moved to a new location should be fed the same feed used previously for at least one week. Change feed type or size gradually over a period of at least 7 days.

After the proper feed is selected more decisions are required. Most farmers feed fish manually. For optimum growth, fish should be fed approximately 3 to 5 percent of their body weight daily until they reach 1 pound. The 3 percent rate is common. Above 1 pound, 2 percent of their body weight is adequate. Do not attempt to use ready-made feeding tables. At best these "short cuts" will fail to assure maximum growth. At worst they will either underfeed the fish, which will result in poor growth, or overfeed the fish and cause water quality problems. One short cut that has worked well is to feed a floating pellet and provide all the feed that the fish will consume in 15 minutes. Feed fish at least twice a day until they reach 8 inches. Larger fish usually are fed only once per day.

Under the best conditions, fish will double their weight every 30 to 60 days depending on size. Therefore, increase the amount of feed fed daily or at least weekly. Calculation of a certain percentage of body weight does not mean this is exactly what the fish will eat. A continuous check must be made to assure that all feed is eaten. Follow these general rules:

- Feed the fish, not the pond.
- Do not feed in the rain as fish will not feed.
- Cut feeding rate by 1/2 when water temperatures exceed 90°F.
- Unless adequate aeration is available, cease feeding when more than 4 consecutive days of overcast weather have occurred. Feeding may be resumed after the first day of sunshine.
- Adjust feeding during periods of high humidity or low pressure. Oxygen tension is low and fish are sluggish.
- Morning is the preferred time to feed. If maximum growth is desired, split the feeding between morning and evening.
- Feed in water less that 4 feet deep. Deep waters tend to be lower in oxygen content and fish may not feed.
- At least 10 percent (preferably 25 percent) of the pond area should be covered when feeding.
- Red drum do not feed well below 60°F. During cool weather feed on warm sunny afternoons.
- If fish stop feeding, determine the cause immediately and correct it. Don't resume feeding until the adverse conditions present are corrected.
- During the summer months do not feed for at least 24 hours before harvesting the fish.

Water quality

The most critical component of water quality for red drum is dissolved oxygen, just as it is for other species of fish and shellfish. A reduction in growth is apparent when dissolved oxygen levels drop below 4 ppm. Below 3 ppm the fish become stressed, go off feed and may succumb to diseases. Experienced pond managers know that dissolved oxygen is lowest in the early morning hours and measure dissolved oxygen during this period. Measurements also are taken during the late afternoon and evening to predict the possibility of low night-time dissolved oxygen levels. If a regular schedule of measuring and recording the dissolved oxygen in each pond at 6 a.m., 6 p.m. and 10 p.m. is followed, it is possible to be quite accurate in this prediction. Corrective action may be taken by pumping or using aeration as described in SRAC publications 370 and 371 on pond aeration.

Monitoring the temperature, salinity and pH also is important. Each of these can be affected when well water or surface water is added. Both surface and bottom water sampling are important to make decisions about flushing the pond to remove accumulated feed and fecal material, break up stratification and increase or decrease salinity. Correction of undesirable water conditions based on regular sampling often determines economic success in red drum production.

Harvesting

Timing of harvest is critical. The most important factor is market availability. If fish are sold for immediate processing, the pond can be seined with a grading seine that captures fish of desired sizes. Remaining smaller fish will have more space in which to grow and less competition for food. Multiple harvests yield more pounds per acre. If fish are sold for use in fee fishing operations, they must be handled gently with minimum stress. Fish should not be fed for 24 to 48 hours before harvest, and well aerated, cool water should be pumped into the pond for 4 to 6 hours before seining.

When the seine is pulled near shore and fish become crowded, aerators and/or fresh water should be available. This practice minimizes death losses from excessive stress.

If a complete harvest is desirable, the pond can be drained after most fish are removed by seining. If the drain pipe is of appropriate size, the remaining fish can be drawn through the pipe and collected in nets. If the drain pipe

Table 1. Preliminary projected income statement for a hypothetical 120-acre commercial redfish (red drum) farm (first 5 years).

PROJECTED TOTAL HARVEST AND YIELDS:	lst	2nd	3rd	4th	5th
Total harvest, whole tbs. in 1,000s:	o	427.5	427.5	427.5	427.5
Average yield, whole lbs. per acre:	o	3,563	3,563	3,563	3,563
GROSS SALES:			**(in 1,000s)**		
Redfish (Red Drum), whole fish:	$0.0	$102.6	$102.6	$102.6	$102.6
Redfish (Red Drum), processed fish:	0.0	481.5	481.5	481.5	481.5
TOTAL GROSS SALES:	$0.0	$584.1	$584.1	$584.1	$584.1
DIRECT OPERATING EXPENSES:			**(in 1,000s)**		
Fingerlings (if purchased)	$14.1	$14.1	$14.1	$14.1	$14.1
Feed, yearlings and growout fish	$48.8	$133.4	$127.8	$122.3	$116.7
Processing	0.0	30.1	30.1	30.1	30.1
Fertilizer	1.0	4.7	4.7	4.7	4.7
TOTAL DIRECT EXPENSES:	$63.8	$182.3	$176.7	$171.2	$165.6
GROSS PROFIT:	($63.8)	$401.8	$407.4	$412.9	$418.5
OTHER OPERATING EXPENSES: (3.0% Inflation/Year)			**(in 1,000s)**		
Salaries, manager and technicians	$72.4	$74.6	$76.9	$79.2	$81.5
Electricity	10.7	56.4	58.1	59.8	61.6
Wage labor 24 man-hrs/pond	1.0	2.5	2.6	2.7	2.7
Land leasing fees	13.5	14.0	14.4	14.8	15.2
Total depreciation	74.5	126.7	89.5	67.1	67.1
Business insurance	10.0	10.3	10.6	10.9	11.3
Professional fee	15.0	5.0	5.2	5.3	5.5
Licenses and property taxes	4.0	4.1	4.2	4.4	4.5
Car and truck expenses	6.0	6.2	6.4	6.6	6.8
Miscellaneous expenses	5.0	5.2	5.3	5.5	5.6
Pond and other maintenance	10.0	10.3	10.6	10.9	11.3
TOTAL OTHER OPERATING EXPENSES:	$222.1	$315.3	$283.7	$267.1	$273.1
TOTAL DIRECT AND OTHER EXPENSES:	$285.9	$497.6	$460.4	$438.3	$438.7
NET OPERATING INCOME BEFORE TAXES:	($285.9)	$86.5	$123.7	$145.8	$145.4
ESTIMATED INCOME TAXES:*	$0.0	$22.9	$38.9	$48.9	$48.7
NET OPERATING INCOME AFTER TAXES:	($285.9)	$63.7	$84.8	$96.9	$96.7

*Estimated income taxes do not include alternative minimum taxes and other taxes applicable to corporations.

is too small, fish must be picked up by hand when the water is removed from the pond.

Hauling containers for fish are recommended in other SRAC publications. For best results, fish should be kept alive until they reach their market destination. Fish will be more acceptable and less likely to have undesirable flavors if they are kept alive until processed.

If fish cannot be kept alive, then they should be sold gilled and gutted on ice. This procedure provides acceptable results.

Marketing

The most recent figures available (1986) show that the market for red drum was 13.5 million pounds. Most of the landings come from the Gulf Coast. Because the Gulf is now closed to commercial capture of red drum, this seems to show that aquiculture production of red drum should have a ready market. In addition, several states have passed laws that allow only red drum produced in aquaculture installations to be sold in the state.

Processing plants on the Gulf have traditionally processed red drum and provided a market for farm raised fish. Most of these processors sell to wholesalers who transport the fish fish directly to retailers. For fish grown at inland locations this is not a ready solution.

Other possible outlets for red drum are sales to fee fishing operations. At present this is an unexplored market because of the failure of fish to live overwinter. If warm water is available, red drum could be kept in fee fishing ponds throughout the year and furnish a valuable recreational fishing opportunity. At least one small operator processes the fish at his production facility and sells directly to the public. This method of marketing has the advantage of higher fish prices. The disadvantage is a very long sales period rather than selling the fish atone time. There also is the possibility that future health regulations will mandate standards for even the smallest processing plants.

Production economics

Very limited data is available on actual production costs at commercial installations. Four operators produced and sold marketable red drum during the past two years. Based on reported food conversion ratios red drum require 2 to 2 1/2 pounds of feed per pound of gain. Additional costs are very similar to those projected for the channel catfish industry. This seems to show a cost of production under ideal conditions that would approximate $1.15 per pound when the cost of fingerlings and labor, amortization of debt and delivery to a processing plant are added. Because the market has not been tested, the profit picture is clouded. The generally quoted price of $1.30 to $1.35 per pound for whole, live fish leaves a very small profit margin at 3,500 pounds per acre.

A preliminary projected income statement for a hypothetical commercial redfish (red drum) farm is shown in Table 1.

To develop accurate predictions on profitability of a red drum operation, it is recommended that the prospective producer take advantage of one of the decision making computer programs. These are described in detail in SRAC Publication No. 380, *Computer Software for Aquaculture.*

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