Out with the hogs and in with the fish:

Feasibility of tilapia farming in a former hog-waste lagoon

Kyle Watkins and Sean Clark, Agriculture and Natural Resources, Berea College

BACKGROUND

In 2009 the Berea College Farm discontinued its confinement hog operation, replacing it with an outdoor production system. The former hog-finishing house was retrofitted for shiitake mushroom production in 2010. In the summer of 2011 the former waste lagoons were evaluated for aquaculture, including channel catfish (*Ictalurus punctatus*), prawns (*Macrobrachium rosenbergii*), and tilapia (*Oreochromis niloticus*). This is a summary of the feasibility of producing tilapia in cages.

TILAPIA PRODUCTION TRIAL

Tilapia were grown in cages suspended in a 0.26-acre, aerated pond on the Berea College Farm that held liquid hog waste until spring, 2010. Four cages (4 by 4 ft) were each stocked in late May, 2011, with 50 fish weighing an average of 0.75 lbs. The fish were fed conventional pellet feed throughout the summer and harvested in mid-September. Standard water quality variables were measured regularly and records kept on input costs. An economic analysis was performed using input costs and market value to determine if the enterprise could be profitable in the future.

WATER QUALITY

Water-quality variables included: temperature, dissolved oxygen, alkalinity, chloride, nitrite, water hardness, pH, and ammonia. All measurements were within the recommended ranges according to the Southern Region Aquaculture Center (Figures 1A-C and references).

Figure 2A. Tilapia production costs and gross revenue based on current costs and selling live fish at $1.50 or $2.00 per lb.

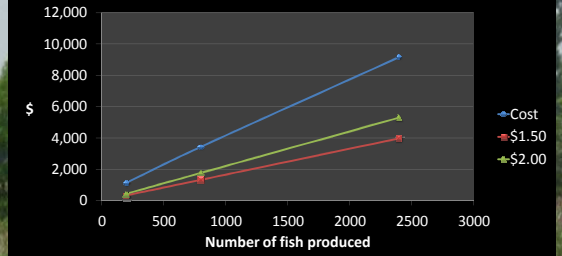
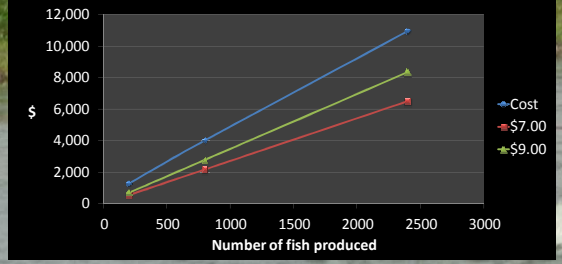


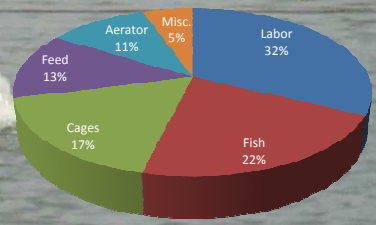
Figure 2B. Tilapia production costs and gross revenue projections for 2400 fish based on selling fillets at $7 or $9 per lb and fish stock costing 50% less.



ECONOMICS

At the scale of 200 fish the costs of production exceeded gross returns considerably when selling the fish live, even at $2.00/lb (Fig 2A). Based on the tips provided for the fillet-processing offered on sale day, we concluded that customers would be willing to pay $7-9.00/lb for fresh tilapia fillets. After adding in the cost of filleting and projecting to 2,400 fish, the costs still exceeded gross returns, even if the purchased fish stock is assumed to cost 50% less than in this trial (Fig. 2B). Labor for feeding and harvesting accounts for the greatest fraction of the budget but the cost of purchasing fish stock is also considerable (Figure 3).

Figure 3. Breakdown of production costs for 400 tilapia.



FISH PRODUCTION

The harvested live fish weighed an average of 1.3 lbs each for a gain of 73% during the 14-week period. However over 15% of the fish died due to an apparent bacterial infection. The remaining fish were treated with an antibiotic, adding to the production costs. The fish were harvested in early September and sold live for $1.50/lb. Customers could have them filleted for tips on harvest day.

CONCLUSIONS

At this scale tilapia production is unprofitable, even when there are no costs for pond construction. Substantial improvements in labor efficiency per unit of production (50% less) and much cheaper purchased fish stock (75% less), along with 2-6 times as many fish to spread fixed costs, would be needed to make this enterprise profitable. Specialty, high-end markets where gutted and scaled fresh fish sell for over $5.00/lb could also be an option.

Figure 1A. Water pH

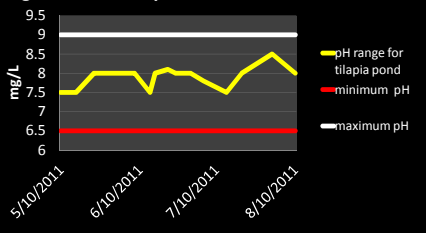


Figure 1B. Pond temperature

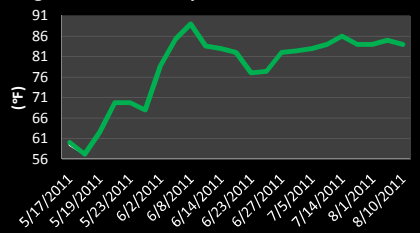
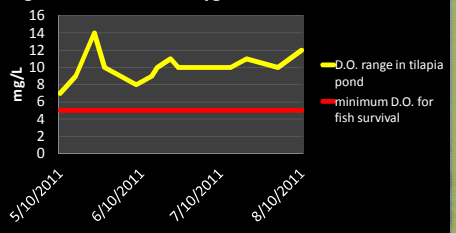


Figure 1C. Dissolved oxygen



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