

# Economic & Management Issues of Recirculating Aquaculture Ventures

Dr. Michael B. Timmons

Professor

Department of Biological & Environmental Engineering

Cornell University

Ithaca, NY 14850 USA

Recirculating Aquaculture Systems Short Course

This presentation is based upon the author's personal experiences of having been a principal in starting up a commercial tilapia farm in NY State in 1996. Fingerlakes Aquaculture LLC (FLA) was initially a 200,000 lb (100 ton) per year, fully-integrated tilapia farm that included breeding stock, hatching, and growout operations. The farm was based upon the principles of recirculating aquaculture systems (RAS) technology presented in this text. The farm broke ground in July 1997 and started selling their first fish in May of 1998 (10,000 sq ft, 250,000 lb/yr). An equity round of financing was initiated in fall of 1998 and ground was broken for this facility in April of 1999. First fish sales from that facility (40,000 sq ft, 1.2 mm lb/yr operation) in January 2000. The farm later expanded to a production capacity of 1.2 million lb/yr (600 ton). During this time, several rounds of financing occurred including capital injection by a venture capital firm. FLA's major market was the Chinese live markets, with a small amount of production targeted for the processed fillet markets.

# Fingerlakes Aquaculture LLC

- Fully integrated tilapia farm, breeding, fingerling, growout
- 1999 production 150,000 lb/yr (Phase I)
- Sold 500,000 lb during 2000 (Phase II, new facility)
  - Designed for 1.2 million lb/yr
- Positive cash flow by January 2002

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This was a struggle! Structural failure in biofilter design caused a 3 or 4 month delay which led to a cash shortage. This resulted in a restructuring of company ownership.

Four individuals created Fingerlakes Aquaculture LLC in June of 1996: one was the author (M.B. Timmons). At that time, live market prices for tilapia sold at the farm, located in upstate New York, exceeded \$2.00/lb (\$4.40/kg). These market prices did not hold, however. Prices began to fall, and continued to deteriorate, and by late 1999, the market price was just over \$1.00/lb (\$2.20/kg) at the farm. Recently, the market price has recovered to a farm price of \$1.40/lb (\$3.08/kg) liveweight, but well below the initial farm price levels when the farm was on paper.

In July 1998, FLA received a second major cash infusion from a successful entrepreneur. This individual had extensive and successful startup experience, which included agricultural and seafood types of businesses. Further rounds of financing were required in 1999 and 2000. Each new round of financing brought with it a significant dilution of the founding members' ownership percentage, but the personal guarantees and assignment of personal assets placed by these individuals to enable bank loans remained in place. These cash infusions and loans were simply part of a long struggle to increase production capacity from 200,000 lb/year (91,000 kg/yr) to the targeted 1.2 million lb (545,000 kg) per year. FLA is still planning further expansion to a production volume that will make automated processing cost effective.

## STRATEGY

Become the low cost producer of farm or tank raised white fish for the US mass market consumers of fresh fish. Use this competitive advantage to sustain a marketing program to brand Tilapia as a substitute fresh white fish.

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A phased production program, i.e., a ramp up, is the most realistic approach to achieving the goals of the business. Most business plans start with some large scale operation, which is usually necessary to show a positive cash flow. Unfortunately, almost always, these operations, if funded, are unsuccessful. It is extremely difficult to achieve large scale success without having first built this capacity incrementally from smaller operations. This incremental increase in size and complexity of operations enables your management team to learn-by-doing wherein the inevitable mistakes will have a less devastating impact on a smaller operation than they would on a large scale operation.

## Strategy (continued)

- Apply proven techniques of fresh poultry production and marketing to the fish farming industry to establish substitute protein source to current declining salt water species
- Establish **FINGERLAKES FRESH** as an “ultimate” brand

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Given a sound technical approach, the ability of the management team to operate the business is the single most important factor in the determination of ultimate success or failure. Simply adding additional like-item systems of a proven and fixed design that is already working well is the best way to increase the size of the operation. If you choose to incorporate untested and unproven designs into your expansion plans, you will undoubtedly face unexpected problems that will compromise your ability to achieve the cost effectiveness that is predicted on paper. On the other hand, once you have a working system and management protocols refined at some reasonable scale, e.g., 200,000 lb (91,000 kg) per year, then this system or farm can be replicated as many times as necessary to reach the desired production levels and obtain the economies of scale necessary to achieve an economically competitive position.

## Lessons Learned

- Don't do it!
- Stop before it's too late
- If you start, do **NOT** run out of money (I'll mention this again)

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## Lessons Learned (continued)

- 2, 2, 2, 2 rule
  - twice as long
  - twice as much
  - twice as hard
  - 1/2 as much (revenue)

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We were very experienced, had years of experience. Had prototype farms to build from in each case. And we still had enormous problems. Our estimates of capital costs were very close, but construction delays caused cash flows for operating capital to be dragged out beyond our original projections, which caused severe problems.

Twice as hard. Yes, it really was and we really thought we knew what we were doing.

1/2 as much. Don't forget this unpleasant potential surprise. Particularly, if the particular species is selling less than 10mm lbs or so in the US, then you and your friends may flood the market which will result in DRAMATIC market price drops.

## Lessons Learned (continued)

- Commodity versus niche
  - 200,000 lb/yr (worst position)
  - 10,000,000 lb yr (competitive)
  - 25,000 lb/yr (niche, family oriented)
- Do NOT NOT NOT run out of money
  - speed of ramp up and operating costs prior to full production targets

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The rule in any business and particularly in STARTUPS is that “CASH FLOW IS KING”.

Manage the money stream. Close your books every month and make adjustments in plans and procedures when necessary.

## Keys to Fingerlakes's Expansion Success

- larger scale of operations
  - unit input prices lower & overhead per unit goes down
- trained workforce
- improved technology
- adequate water
- greatly reduced electrical costs
- targeted marketing approach

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Assuming you have followed my advice of starting a “small” operation and have managed that operation successfully, you are then ready, and only then, to expand. You will have most of these same advantages listed above. Training your people can not be over emphasized.

And of course, without water, it is hard to grow fish. Our first farm had inadequate water. Why didn't I listen to my own rules. I was too eager to get the farm going. Don't fall into this trap. If the site's water supply is not adequate, then look elsewhere, even if it means you just wasted drilling \$10,000 worth of wells. See the next slide for more water details.



## Mistakes

- “Slight” changes in prototype (from Cornell system)
- Lack of adequate water supply
- Under-estimating water requirements:
  - Purging requirements
  - Cleanup requirements
  - Flushing during tank emergencies
  - General usage around farm
  - Deterioration in well supply (50% at least)

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The engineer’s curse “...keep tweaking things..”. Yes, I did it too. We had a prototype system at Cornell, but I wanted to make it a little better. Wrong. Little, subtle changes in an RAS—can have dramatic impact on water quality and system performance.

Read the rules closely above for what constitutes adequate water and do NOT compromise on site selection.

## False Assumptions

- Applying successful prototype systems to alternate species
  - feces differences
  - water quality tolerances
  - differences in performance and behavior of water conditioning equipment, e.g. fine solids capture in coarse or fine sand fluidized beds

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While RAS principles in general will “generally” apply, a successful RAS for trout may not work at all for a tilapia system. Again, start at a level that you can test and verify before betting the ranch!

## Most Important Resource: Management Team

- You can overcome just about any challenge if you have a good management team
- Prior experience a necessity
  - can build “in house” via a series of expansions
  - dangers of going too big too fast

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Build your farm around your people. A good facility manager can save you his salary several times a year with proper judgment calls.

Experience in non RAS is almost a LIABILITY. Management is somewhat by “feel” and their “feel” for the system is ALL WRONG. Be careful in assuming a fisheries biologist who has managed intensive raceways is going to instantly fit into an RAS operation and be able to exercise sound judgment calls is “wishing”.

## Financing & Sources of Capital

- Look in the mirror...
- Look in the mirror again!
- Bank's View (Bank guaranteed loans are a myth)
  - you will fail and therefore they require a “perfected” secured loan
  - salvage values of 10 cents on the Dollar at best

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Be prepared to personally guarantee all loans. And be prepared to have your guarantee called by the bank. Even federally guaranteed loans will usually require a sponsoring bank and the bank once again will want your personal guarantees. The worst are perfected guarantees where the bank actually requires you to assign these assets to them, just in case they have to cash them in quickly.

## Financing (continued)

- Venture capital for aquaculture startups does NOT exist
- Venture capital for expansion efforts can be obtained
  - Requires close personal contacts and documented previous success

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Most folks starting up have this mis-guided dream that venture capitalists and angel investors are just waiting to invest in your fish farm idea. Number one rule is that they will NEVER NEVER invest unless you can show them your currently running farm that was financed by YOUR capital. If your current operation impresses them, then they become candidates for equity investors.

## Financing (continued)

- Takes a tremendous amount of time to obtain
- Takes an immense amount of patience and ingenuity
- Even successful securements, take several months to obtain actual \$\$\$ in hand

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You can not imagine how much time it takes. Fingerlakes' CFO estimated that 90% of his time was spent on fund raising activities during a 12 month period of equity financing activities and the President estimated 40 to 50% of his time.

Remember that about 1 in 1,000 Business Plans submitted to VC's are funded and some put the ratio at 1 in 10,000. This is not a highly fertile ground. And of course, personal contacts are everything.

## Investment Choices

- Only invest in operations with proven success
  - includes investing your own money
- Probability of success of a startup venture very small

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Ask yourself, would you invest in your farm at this point, knowing everything you do. Be assured, the outside investor will uncover all your warts and wrinkles during the due diligence process. Don't hide anything.

## Species Choice

- myth of high value species (let's do walleye?)
- successful aquaculture results in dramatic drops in wholesale price
  - salmon, striped bass, tilapia

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The only reason there are high prices on certain species is because there is a market shortage. Once the shortage is addressed, new production and sources, the market drops. The most successful way to maintain a high value for your product is direct marketing, but most fish growers do NOT want to market their products.

The rapid price drops in fish are well know and should be kept in mind. Look at what competing alternatives are selling for to give you a better idea what price is a realistic target in putting together your Business Plan.



## Reminders

- Catfish farm side @ \$0.75/lb and 45% fillet yield => tilapia farm gate at \$0.55/lb
- establishes commodity price for “other” species

## Reminders: Broiler production

- 1,000,000 kg/yr per person
- \$0.10/kg for labor, capital costs, utilities (most)
- twice feed requirements per unit meat produced
- productivity per unit space only 50% of indoor fish production

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Ultimately, aqua production using RAS will prevail because of the advantages. RAS is competitive now with mature forms of technology (ponds, net pens) and should see significant improvements over the next 10 to 15 years.

## Some other gentle reminders

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## Marketing Efforts: What FLA did

- Wegman's fillets and whole fish
  - Test marketing with local Wegmans
- Live Fish Market wholesaler (Philadelphia)
  - Chinese Market in Rochester
- Restaurants (local)
- Stew Leonard's (Norwalk and Danbury CT)
- Whole Foods Inc (Bread & Circus)
- Sysco Foods

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## Cost Analysis: Impact of Scale

<u>Direct Costs</u>	<u>Freeville</u>	<u>Groton</u>	<u>Phase IV</u>
Lbs/Yr (whole fish)	250,000	1,500,000	10 million
Labor	\$0.61	\$0.15	\$0.11
Feed	\$0.39	\$0.26	\$0.14
Utilities	\$0.37	\$0.12	\$0.08
<u>Oxygen</u>	<u>\$0.14</u>	<u>\$0.03</u>	<u>\$0.02</u>
Total	\$1.51	\$0.56	\$0.35

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## Fillet Cost in Store

Raw Product (30% yield)	\$1.18	FLASell@ (40% margin)	\$2.47
Processing (automation)	0.15	Retailer add 40%	+ \$0.99
Packaging	0.08	<b>Retail Price</b>	<b>\$3.46/lb</b>
Ice & cooling	0.02		
<u>Shipping</u>	<u>0.05</u>		
Tot Direct	\$1.48		

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Raw product at \$0.35/lb and divide by 30% yield = \$1.18

A good rule of thumb is that “retail” is 7x the farm cost of production; for example

Start with \$1.00 per lb of whole fish; farmer makes 20%

=>\$1.00/0.80 = \$1.25

Now, the processor obtains a 33% yield and adds on 25% to cover their costs and small profit , so

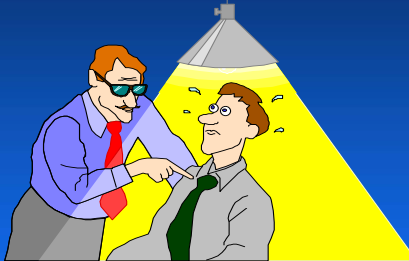
=>(\$1.25/0.333)/0.75 = \$5.00;

=>Now, processor sells to a wholesaler (adds15%) and then the retailer adds on 25% and you have:

=>\$5.00/0.85= \$5.88 and then \$5.88/0.75 = \$7.84 per lb

And everyone says they are making “no money” in the process...

It looks so good, it's scary!



Any Questions or Comments ?

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Final advice. Be careful. Only invest what you are willing to lose. Assume that you need at least enough cash to handle 18 to 24 months of operation without cash flow support from the time you start a pay-roll.