Getting Started in Aquaculture

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6 Critical rules for success

1. Keep the fish wet
2. Big fish eat little fish
3. Critical components need 3 levels of redundancy
4. You can’t make money growing fish
5. Most operations fail because of poor business planning
6. Don’t make the same same mistake twice

“I have this pond…”

- Can I make money with it?
- What can I grow?
- What is it going to cost me?
- How hard do I have to work?
- Are there any subsidies?
- What do you mean it’s not my pond!

Goals- A fork in the road

- Profit
- Feed the family
- Agricultural experience for kids
- Landscape improvement
- Recreation

Write it down!

Ron's Rule

If it doesn't work on paper
it won't work in the real world

Jim's Corollary

If it does work on paper
it still may not work in the real world

Project Notebook
what it is

- Composite results of market identification and bio-programming
- Describes a properly evaluated and functional facility
- Includes cost projections, construction and operations schedule

Project Notebook
what it does

- Enables immediate decisions without further work
- Provides a framework to sell your idea to financial backers
- Guide for subsequent phases of development in spite of
  - Postponements
  - Changes in permitting
  - Changes in designer

Where do I start?

- Road map- Business Plan
  - Market Identification
  - Bio-programming
  - Facility characterization
  - Financial analysis
  - Environmental impact (Permitting)

Resources

- RAC publications
  - ncrac.org
  - srac.tamu.edu
  - nrac.umd.edu
- White Papers
  - aquanic.org
- Aquaculture associations
  - wisconsinaquaculture.com
- Extension specialists
  - Aquaculture.uwsp.edu

Market identification: finding a hole in the market

(see rule #4)

- Fish species
  - Outdoor- environmental limitations
  - Indoor- market limitations
- Target audience
  - Wholesale
  - Retail

Market identification

- Product(s)
  - Product form
  - Value added
  - Vertical integration
- Pricing
  - Market price
  - Premium price
  - Breakeven price
- Production level
  - Quantity
  - Flow

Market identification

Ultimately the question to be answered is:

How is my product different from existing products in the marketplace?

Some of the answers to this question are:

convenience, quality, price,

feel-good factor

Know and understand your competition!

Bio-programming: if you feed it, will it grow

- Goals
  - Statement of intent, purpose, and methodology
  - The what, why and how of the project

Biological criteria

- Species description
  - Propagation and life cycle
  - Production cycle
- Behavioral characteristics
  - Negative attributes
- Culture techniques
  - Propagation
  - Juvenile needs
  - Grow-out method

Biological criteria

- Environmental requirements
  - Water quality
  - System limitations
- Nutritional requirements
  - Feed conversion ratio
    - Lbs of feed/lbs of weight gain
  - Live
    - Minnow size is critical
  - Formulated feeds
    - Fish meal vs grain based diets

Biological criteria

- Growth rates
  - Time to market size
  - Relevance to production cycle
- Mortality rates
  - Survival at different life stages
- Diseases
  - Veterinary needs
  - Biosecurity

Facility characterization

- Integrates goals, design criteria financial constraints and site conditions into a functional and operational plan

Facility programming

- Production schedule
  - Populations at each life stage
  - Water and space needs
- Infrastructure
  - Water system
  - Production space
  - Support space
    - Feed and equipment storage
    - Processing area
    - Transfer/holding facilities
    - Office space

Production fits site
or
Site fits production

- Predetermined site
  - Economic viability given limits imposed by site constraints
- Undetermined site
  - Optimize biological and physical requirements

Schematic design

- Translates criteria and site constraints into a workable design
- Identify and solve major design problems
- Verify no constraints to production goals

Results in:

- Report describing facility design concept
- Site layout with location of major components
- Floor plans for support buildings
- Schematic diagram of hydraulics, air and power systems -REDUNDANCY!
- Topographical survey-emphasis on water flow
- Preliminary construction cost and schedule

Financial analysis

- Financing source(s)
  - –Bank
  - –Investors
  - –Personal wealth

Financial analysis

- Cost/benefit requirements of owner and financing organization-may require some modeling
  - Interest on borrowed capital
  - Profit distribution to investors
  - Equity in tangible assets
  - Tax considerations
    - Business deductions, depreciation
    - Employee costs
      - Salary, fringe benefits, social security,insurances

Financial analysis

- Phased development
  - Basic necessitiies/immediate needs
    - Small scale trial
  - Cash flow restrictions
    - Mitigated by vertical integration
  - Room for expansion
  - Change in focus

Environmental analysis

- Influences on the environment
- Positive and negative impacts
  - Wetlands
  - Native and non-native species
  - Water table

Environmental analysis

- Permitting
  - Construction and building permits
    - Zoning and pond construction
  - Fish hatchery license
  - Livestock premises registration
  - HAACP food processing license
  - Well drilling and use permits
  - Retail sales license and sales tax number

Questions?

Unsuccessful businesses
do not plan to fail-

They fail to plan!!

Fish choices

- Food fish - depends on water temp
  - Trout, perch, bluegill, tilapia, catfish
- Stocking - source may be a problem
  - Walleye, pike, bass, panfish
- Bait - you can't raise enough
- Ornamentals
  - Mostly indoors
- Recreation - balance is important
  - Beware of excessive reproduction

Aquaculture systems

- Pond
- Raceway
- Net pen
- Recirculation
- Aquaponics

Fish Ponds

Ponds

- Things to consider:
  - Land
  - Water source
  - Effluent
  - Depth of pond
  - Slopes of sides
  - Power
  - Permits
  - Liners

Flow-through systems

Flow-through systems

- Things to consider:
  - High volume of moving water
  - Effluent
  - Permits
  - Aeration

Recirculating systems

Recirculating systems

- Things to consider:
  - Cost
    - Tanks, pumps, filters and biomedia, UV sterilization
  - Back up power source

Net Pens

A way to use big ponds

Aquaponics is…

…the combination of recirculating aquaculture and hydroponics (soilless plant culture).

General comments

- Very water conservative
- Very productive for plants
- Biosecurity critical
- Fish are a byproduct
- Keep the bacteria happy
- Balance and compromise
- Usually indoors so year-round
- Seasonal hoop houses
- Leafy greens work best
- Fruits need pollination

Aquaponics systems

- Three main systems:
  - Media bed
  - Nutrient Film Technique (NFT)
  - Raft system

Media Bed

Inexpensive components

Uses inert media

Flood and Drain

Needs less filtration

Good for fruits and roots

Seeds sown directly

Maintenance required

Media bed

Nutrient Film Technique - NFT

- Small reservoir of water
- Can be tiered
- Greens work best
- Fruits need innovative support
- High filtration needs
- Water flow critical
- Expensive to build

NFT

Raft Style

- Cheap to build
- Easy to operate
- Safe for fish
- Production line
- Simple filtration
- Needs germination
- Almost any size
- Best for greens

Raft Style

Fish for Aquaponics

- Tilapia
- Catfish
- Perch
- Bluegill
- Koi
- Not trout!

Plants for Aquaponics

- Leafy greens
- Fruits
- Roots
- Herbs
- Ornamental aquatics
- Flowers
- Ethnic specialties