Building our Aquaponics Farm:

Insights and Dilemmas

By:
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Do your research

- Talk to people already in the business
- Ask lots of questions
- Tour a variety of facilities
- Be selective who you listen to
- Some people just want to sell systems
- Is it practical?
Start with what you can afford

We found a used 30’x96’ greenhouse frame on Craigslist

We tore it apart and moved it home
Site selection & structure

• Climate?
• Warm year round or seasonal?
• What type of structure?
• Separate structure for fish or under all one roof?
Excavation

- **Hurry**
  - Limited time during dozer rental
  - Had to move a fair amount of dirt with inexperienced operators
  - A “weekend rental” sounds like plenty of time
  - Just enough time before rain or another tank of fuel to get pad level
  - No extra time for landscaping with topsoil
Equipment Rental

- Hurry
- We rented a laser level to level the pad
- We “thought” we understood how it worked
- Tried to save money by a 1 day rental
- Tried to not bother “professional” brother-in-law by asking for help
Gravel

- Next time we would choose a different kind
- Pea gravel is hard to walk on
- Grape sized limestone works better
Erecting Greenhouse Frame

- Hurry
  - Bought and started to assemble in late September 2013
  - We had \( \frac{3}{4} \) of the hoops up and ran into rainy weather
  - The last \( \frac{1}{4} \) of the hoops gave us trouble staking in muddy ground
  - We finished the frame just before winter
OH NO?

- What did we just get ourselves into?
- How do we manage an aquaponics system?
Education

• After lots of research we chose a 5 day training course in Tennessee
• The price included 5 days on site with several “extremely detailed” instruction manuals to take home
• Today we are still happy with our choice & feel it was perfect for us
• OSU Piketon – Looking for 25 fish farmers?? What do I know about raising fish?
• I filled out application and to my surprise I was accepted
• Commitment – 1 class a month for 12 months – 3 ½ hrs away
• Best decision I ever made related to aquaponics – I LOVED IT!!!
Time to Get Started

• It is now Spring 2014

• Cover frame with plastic:
  I don’t think so.

• Time to hire Amish greenhouse guys
Change of Plans…Already?

Mark: “I think we need a barn?”

• At first fish tank was going to be inside greenhouse
• Fish tank inside small 14’x20’ storage barn? Why not?
• Frees up more grow space inside greenhouse
• Better control of water temperature
• Better light control
Buy Barn Kit
Change of Plans...so soon?

- Barn complete
- Wow, we need a work area
- What are we going to do with all this stuff
- Generator, ladders, power tools, misc. equipment
- We need a storage barn – Move fish back to greenhouse
Build Troughs

• Follow instruction manual
• Start making shopping list
• Head to store for lumber, paint, and many supplies
• Cut and paint lumber for 2 troughs
Change of Plans...again?

• Planned to comfortably fit three 72’ troughs
• Plenty of room to walk around them
• Let’s think about this?
• Three troughs equals one 72’ plus return plumbing line to fish tank
• Make smaller walkways & add a 4th trough
• Win, Win! Permanently adds grow space for additional 1152 plants plus cuts back on plumbing pipe
• Let’s do it!
Starting the Building Process

• The start of many trips to a variety of hardware stores
• Purchase more material to build a 4th trough
• Spend countless hours working on troughs each day after working full time jobs
• Something doesn’t seem quite right
• Check that line level again, for the 50th time
• Why do we need so much more gravel at this end of the greenhouse?
• What to you mean the trough boards are warping?
The Value of an Experienced Professional

• New Project Manager...YEA!!

• My brother arrived for a 6 week trip back home.

• 40 plus years experience owning his own construction company
Project Managers Suggestions

• Bad news - Pad not level
• Training on “Steve’s way” to check grade
• Tear down the first trough
• Dig out more clay & redistribute gravel
• Now we need another load of gravel “Limestone” this time
• First trough boards warped
Rebuild Troughs

- Take advantage of 2 extra bodies so we’re not taking time now to pre paint rest of trough boards before construction
- To keep natural gravity flow of water, each trough must be 1” lower than previous trough
- Must dig more clay & gravel out of trough before they are low enough for trough frame
- Fixed warped boards by cutting them & adding extra support stakes.
Change of Plans...again?

• Hurry
• Do you think we will be able to plant by Fall of 2014? Ha ha ha!
• Well lets just get first two troughs up & running. We’ll finish last two later
• First trough framed in
• Add 2” blue board insulation to bottom of troughs
• Start to install 1st trough liner
• What do mean trough liner was damaged in transit
• Return liner and wait for replacement
Order Fish Tank

- Change plans yet again
- Who knew picking out a fish tank could be so difficult
- Did you know that yellow perch prefer a round tank? I learned that at Boot Camp
- A stop at Fresh Harvest Farms on our Boot Camp Bus Tour taught us that food gets caught on the ledge and then turns moldy. Thanks Doug!
Order Rafts, Seeding Pucks and Seeds

- While at our aquaponic training in Tennessee, our host Randy, was starting a business designing styrofoam rafts made smaller & with the holes pre formed.
- He also made a connection to get seeding pucks.
- Ordered heirloom, organic seeds
Painting Troughs

- Never too young or old to help
- 86 yr old mother
- 3 yr old granddaughter
Plumbing Concerns

- Mark had concerns about the plumbing
- More difficult to add in the 3rd and 4th trough at a later date
- Disconnect the system to reroute the return lines to the fish tank
Change of Plans Yet Again

• Back to original plan of starting up all 4 troughs at one time
• Makes more sense to do it now then redo plumbing a 2nd time
• Dig more clay out of 3rd and 4th trough
• Order 2 more liners
• Add 2” blue board insulation to bottom of troughs
• Return another trough liner for damage during transit
• Attach liners to troughs
Changes Yet Again

• Fish tank location
• Was going to sit at East end of the greenhouse away from the road.
• Added barn and now does not work in this location
• Ordered fish tank
• Oh, how do we get a 1200 gallon fish tank in the side man door?
• Better move the big doors from East end of greenhouse to West end
Hire the Professionals

- Electrical work
- Erect new power pole
- Install electrical box & ran wire from pole to box
- Drill water well
- Attempted to have health department test water sample
- Miscommunication? Did not get the though analysis we wanted
Odds & Ends

• Mark installed electrical conduit and we tried to fish the lines through it
• Whoops, bought wrong kind of wire
• Finish running wire and installed the outlet boxes
• Finish plumbing water and air lines
• Insulate fish tank
• Lay weed fabric
• Finally, time to fill the tank and troughs

• According to our instruction manual, we were supposed to add a certain percentage of bleach and leave the rafts off for a few days

• Anxiously arrive the next morning only to find BROWN water
Water Issues

- I had to leave work to drive new water sample to Holmes Laboratory for a full water analysis
- Found we had a chemical reaction to manganese when bleach was added
- Dump all the water and scrub the liners
- Refill the tank and troughs
- Plant first sprouting table full of seeds
Waiting on Fish

• Kept in touch with Tom concerning our water issue
• Finally brought us fish...only 8?
• Wanted to make sure the 8 survived before he brought more
• A week later he brought 100 pounds
Backup System

- We do not live at this location but are 3 miles away
- Power failure?
- Cell phone line is plugged into same outlet as air blower
- Power failure, phone sends us a text message
- We jump in car, start manual generator
- Power restored, receive another text message
- We jump back in car and shut off generator
- First trial worked fine. Lost power during storm for 2 hours
- Second trial, worked fine. Just blew outlet breaker
Ammonia Spikes

• Unfortunately it’s not as simple as just adding water, fish & seeds
• Since the fish arrived it has been a constant battle for us fighting high ammonia
• Call Doug for advice
• We have dumped more water from the fish tank & troughs than we care to admit
• It sometimes felt like we were on a regular schedule every so many days - High ammonia, stop feeding fish and dump the water
• Repeat on a regular basis
• We thought we had some pretty tough fish as we didn’t lose any though this process
High Nitrites

• Ammonia spike finally settled down
• Yea, finally have some nitrates
• Maybe the system is finally stabilizing
• Arrive one morning to find 2 dead fish? I guess we’re not stable after all.
• We knew the nitrites were high but we didn’t panic since the fish appeared to survive the ammonia. We just dumped a little water like normal
• I found 7 more dead at lunch time. Time to call Doug, who later called Bill and OSU for advice. Quickly, dumped a lot of water
• Oh no, lost a total of 20 fish that day
• Root cause, nitrite too high, feeding fish too much
Current Update

• Really have cut back on fish food (Feel like guilty fish parents)
• Haven’t lost anymore fish since the 20 during the nitrite spike
• Ammonia has stayed low
• Nitrites are better
• Still have very low nitrates
• Texted Doug for advice on how to get the nitrate numbers up
  “Patience Lori, build it and they will come”
War on Bugs

• Arrive at greenhouse one day and start noticing little black leafhoppers eating the radish tops and pak choi
• They kept multiplying and multiplying and multiplying
• Great, now what are these little green worms?
• We don’t want to kill anymore fish just trying to kill the bugs
• Mark orders 4000 lady bugs, turned them loose but they only stayed for a 1 ½ days. The sides weren’t screened in yet. Now what?
• Diatomaceous Earth has made a big difference for us, that is until we found wormy radishes today.
• Back to the drawing board
Professional Help?

Mark & I have hired very little professional help.
- Attaching greenhouse plastic
- Installing electric service
- Drilling water well

Smart choices? Not always.
Save us money? Not always
Do it the same way again?
According to Mark, not always
Take Away Facts

• Took much longer than anticipated from buying a used greenhouse frame in September of 2013 to harvesting our first head of lettuce in May of 2015
• Changed plans many, many, many times
• Countless trips to Lowes, Menards & local hardware store
• Will definitely consider asking for professional help much more often
• PATIENCE...Do not hurry
OSU Boot Camp

• Unlimited source of information
• Loved the hands on aspect
• Classroom instructions also included Business Management and Marketing Strategies
• Mentoring
• Making connections through Ohio Aquaculture Association (OAA)
• Loved touring the many different facilities. No two were the same.
• Was exposed to the very best:
  • OSU Piketon Boot Camp Staff
  • College and University Educators
  • Government Specialists
  • Business Professionals
  • Experienced Aquaculture Producers
• Everyone I have come in contact with is more than willing to answer any questions or help in any way.
How Far We Have Come
Local Sprouts Aquaponics LLC wouldn’t be possible without our family & friends.