

Starting-up in Aquaponics, Lessons Learned and Future Directions

By Jeff Hafner

*Background: Early Morning Harvest LLC, (EMH) is a small diversified farm based in Panora, Iowa. Owned and operated by Jeff Hafner, EMH began focusing on establishing an aquaponics system for year-round vegetable and fish production in 2011. Aquaponics is the combination of aquaculture (fish-farming) and hydroponics (Growing vegetables without soil). This production system uses a fraction of the water that traditional field production uses as no water is **wasted or evapotransporated** by weeks. Aquaponics also has the potential to produce high quality vegetables with little environmental impact. This report is a first-hand account from Jeff Hafner. The purpose of this report is to document his first year in aquaponics and to provide information (financial and experience) to other individuals pursuing aquaponics as a hobby or as a business.*

I became interested in aquaponics while overseas and thought it would be a good hobby that fit in with my other farm enterprises. Aquaponics has no weeds and my civilian job did not give me enough time to weed in a conventional garden. I attended one workshop and started by purchasing a prefab system to put in my 30'x52' greenhouse. This was the right way for me to start out as it gave me a support system. I spent most of the first year experimenting with varieties and learning aquaponics. Greenhouse construction was started in October 2010, and fish nursery and aquaponics raft bed for vegetable production arrived in February 2011.

Herbs and greens were highly recommended, which worked well, but we had to learn how to operate and find our markets at the same time, creating issues outside of just producing a crop.

Currently, I run two systems that are tied into a third. I bought a small 4/50 system (four fifty-gallon fish tanks) from Nelson and Pade in Montello, WI. I use this system as my nursery where I grow the fingerlings up to about 50 grams. This system could also be used as a stand-alone system and could grow 16 fish to 1.5 lbs per tank. I also have a 4/300 system (four three-hundred-gallon tanks). These tanks grow 100 fish to 1.5 lbs each. These 2 systems are connected to a third media bed system which is where I drain the solids from the 4/50 and 4/300 and then return the water (without the solids to the 4/300.

Where do you get your fingerlings? –I get my fingerlings from Americulture. They are in New Mexico and ship next day – sort of like getting day-old chicks in the mail. They sell them by the pound so I get 100-200 fingerlings each time. I have been helping some local/hobby aquaponic producers get smaller numbers of fingerlings

Suggestions and things to consider

The first issue arose as a result of miscalculating water recycling ratios. This caused water quality issues which slowed the growth of the fish and caused inconsistencies in the vegetables.

For those interested in an aquaponics system, all I can say is: research, research, research. Look at many systems and go to several workshops. Design your system, check your ratios and have someone else

check your ratios. A small error can cause big problems, making it more critical to be right from the beginning.

Spreadsheet notes

A spreadsheet enterprise budget was developed from the information we gathered during our first year of operation. The period shown is from March 2011 to March 2012. Our farm includes many different enterprises, but for the purposes of the budget, I split the labor out to what was actually aquaponic greenhouse labor.

Labor. The labor under capital includes my labor in set up and is separate from my labor under operation expenses (roughly an hour a day for me), mainly training employees and follow up. Part-time and hired labor includes taxes, social security, etc.

Other costs. LP was estimated as there is not a separate tank for the greenhouse, but the number is likely close to actual usage. Because the equipment is new, there were no repair costs. Any small repairs that did arise during the first year were due to construction and are included in the capital expenses and fixed cost depreciation. Chemicals used consisted mainly of bleach (cleaning), vinegar (lower ph), and salt (purge fish). Insect expense includes ladybugs and lacewings we bought for aphid control. Insurance was the annual premium divided over 12 months. This was hard to split out from the rest of the operation and may be high. Average cost of seeds is 5,000 seeds for \$50 or 1 cent per seed. Items like seeds, rockwool cubes (for holding vegetable roots) and bags are based off of harvest and planting records to get monthly totals. These items are bought in bulk.

Harvest

The receipts portion of the spreadsheet show value for everything harvested from the system. Home use and vegetables given away as marketing are counted as sold product. Issues to point out that we faced during our first year include:

October 2011: system was maturing and we had poor quality product.

November 2011: insect issues when we were fighting army worms

December 2011: we transition from having a product to getting rid of the product

January through February 2012: we couldn't get rid of product and product got old

Marketing

The initial target market for sales was in and around the towns of Panora, and at most, traveling 45 miles into the city of Des Moines. Currently, there are commercial aquaponics systems in Missouri¹, Wisconsin² and other Midwestern states, but none exist in Iowa. **There is a nice one in Leon, Iowa.**

¹ S&S Aqua Farms in West Plains, MO (<http://www.townsqgr.com/snsaqua/>)

During our first year of operation, marketing was a struggle. We were still figuring out the system and had no consistent product, nor did we have a regular customer base (like a CSA). Through trial and error, we learned more about what our customer base wanted.

Lettuce Crop Pricing (red romaine, green romaine, and butterhead)

Started at \$2/lb

\$4/lb most of 2011

\$6/lb in 2012

We are also selling cherry tomatoes for \$8 per pound and basil for \$12.50 /lb whole sale and \$15/lb retail.

We received our processor's license in February 2012, which allowed us to cut and bag the lettuce more and make it more consumer friendly. This allowed us to utilize more of the product.

Selling product to local restaurants was not an option due to pricing. Larger suppliers could outbid us quite easily in those markets, but we could compete well with retail prices and farmers' markets.

Looking ahead

When looking back at our first year in operation, I'd say the biggest obstacle I overcame was the learning curve. This included getting to know "my" system and working through the mistakes we made with our ratios. Biggest obstacle we overcame in the first year.

When looking at the coming year, we will utilize extra high tunnel space that came about due to the correction of our ratios. This space will be used aquaponically, though whether we try a new system or expand our current one is still to be determined.

When asked what I would change if I could, it would be the costs of cooling in the summer and heating in the winter; these remain out of our control at this point in time. I would like to research more use of solar and wind energy,

Would you recommend aquaponics to others, why? I think it is a good option for CSAs for winter production, and to help utilize labor in the winter. I think it is also a good operation for stay-at-home mom/dads for extra income, education, and food. However, it is a personal decision. That is one reason I open my doors to tours and answer question. And another reason for this report. And my suggestion to research, research, research. Examples that come to my mind were: Yes, because it fits in well with labor requirements of other operations, no, finding a market is a major challenge, etc.

References and Resources

² Sweetwater Organics in Milwaukee, WI (<http://sweetwater-organic.com/>)

<http://www.aquaponic.com.au/backyard.htm> this link has a ratio and sizing tool that is free it also comes with instructions.

<http://www.aquaponicsjournal.com/>

<http://www.aquaponics.com.au/index.htm>

<http://aquaponicsaustralia.wordpress.com/>

<http://www.backyardaquaponics.com/>

<http://www.uvi.edu/sites/uvi/Pages/Research.aspx?s=RE>

S and S aquafarms in Missouri.

Nelson and Pade in Montello, WI

¹ S&S Aqua Farms in West Plains, MO (<http://www.townsqr.com/snsaqua/>)

¹ Sweetwater Organics in Milwaukee, WI (<http://sweetwater-organic.com/>)