

Federal-State Marketing Improvement Program
Final Performance Report
For the Period of October 1, 2013 – January 31, 2016

Date: *March 22, 2016*
Recipient Name: *Hawaii Department of Agriculture (HDOA) Aquaculture & Livestock Support Services (ALSS)*
Project Title: *Market Research and Development Program for Aquaponics*
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Project Contact: *Liz Xu/808.483.7104/liz.j.xu@hawaii.gov*

An Outline of the Issue or Problem

Aquaponics is a sustainable farming method that combines fish farming with hydroponic crop production. It uses 80-90% less water compared to soil-based farming, produces higher crop yields, and can be set up in diverse geographical environments. The plants in the system use fish waste as fertilizer, which is natural and good for the plants. Hawaii is a hot spot in the U.S. for aquaponic farming with experienced commercial farms and many backyard aquaponic enthusiasts. The Hawaii Department of Agriculture often receives inquiries from interested people seeking help on starting a commercial aquaponic farm.

A challenge in the aquaponics industry in Hawaii was that the distribution of aquaponic products was limited to small markets such as Chinatown. One reason was that the aquaponic farmers did not know what was required to sell to mainstream grocery retailers and restaurants, nor how to access this bigger market. In addition, most farmers were not familiar with the buying habits, pricing, volume, and food-safety requirements of large retailers and food service industry. It was inefficient for each farmer to contact each store or restaurant and talk to the buyers in order to learn their needs, the size of this market and the competition. Similarly, it was not easy for each buyer in the food industry to accommodate many individual farmers' visits and to educate them about the requirements. In reality, suppliers usually encounter challenges when trying to communicate with buyers. If farmers were to become aware of each big retailer's food safety requirements, desired product forms and important details such as packaging, labeling and quantities before they start their farms or expand their production, they would have a better chance of producing the right products and marketing them appropriately and successfully.

Goals and Objectives

The goal for the market research & development program for aquaponics was to help existing aquaponic farmers expand their market, grow vegetables and fruits and raise healthy fish that meet stores' food safety

requirements, engage more people (especially in rural areas) in aquaponics to create income and more jobs, and strengthen the local food system.

The project had five objectives to meet, which are listed below.

Objective 1: Increase buyers' awareness of sustainability and reliability of aquaponic production, product quality, and transportation and storage cost reduction through local sourcing. The team was to persuade 50 buyers to attend an Aquaponic Products Conference to be held in December 2013 for the aforementioned objective.

With intensive planning and marketing, Hawaii's first aquaponic product conference was successfully held at the University of Hawaii's Kapiolani Community College campus in March 2014. 50 buyers from food wholesale businesses, restaurants, hotels and supermarkets in Hawaii attended the conference, learned about Hawaii's leading aquaponic farmers, their products and tasted the gourmet dinner prepared by the famed chef Alan Wong using aquaponically-raised tilapia and vegetables. As a result, existing farmers made valuable contacts and ramped up their production to meet more demand. All major food buyers were made aware of aquaponics and the premium quality of aquaponic products.

Objective 2: Gather information on purchase pattern, food-safety requirements, and willingness to carry produce and fish from aquaponic farms from at least 30 businesses, including large retailers, high-end restaurants, and leading restaurant chains in Hawaii by March 2014.

30 buyers from the food wholesale industry, restaurant chains, supermarkets and hotels were interviewed on their purchase preferences, volume, frequently purchased product varieties, pricing and packaging requirements. It was discovered that food wholesalers provide most of the products to hotels, restaurants, and supermarkets. Some farmers sold directly to certain restaurants or supermarkets but it was a small number. Food wholesalers can help farmers reach a bigger customer base fast and offer pickup and delivery, although farmers keep less profit. Farm gate prices for many vegetables paid by wholesalers were compiled into a list and shared with existing and aspiring new farmers to help them make better decisions, as well as information such as volume, packaging requirements, food safety requirements and special crops that demand higher prices.

Objective 3: Increase aquaponic farmers' (existing and potential farmers) knowledge of selling to retailers and restaurants. The team would give 5 workshops, create 2 online video courses, and send out flyers, which would be done by July 2014.

5 workshops were held on 5 islands in Hawaii to share with interested people marketing information collected. 110 people attended the workshops and received information packets on economic return of aquaponic farming, marketing data and strategies. 2 training videos were produced to teach people on how to market aquaponic products (6 parts) and how to go through the food safety process (5 parts). The marketing training video features a young local farmer interested in aquaponics farming doing due diligence to vet his idea. He interviewed a successful aquaponic farmer, a seafood wholesaler, a producer wholesaler, a manager at a store selling a lot of local produce, a very popular farmer's market and a trendy restaurant that uses a lot of local ingredients. This video gives a visual guide to the audience how the key players in food industry operate. The food safety video introduces all the related government regulations that apply to aquaponic farming. An inspector working at the Hawaii Department of Agriculture shared some important inspection information in the video. Food safety rules and regulations in the U.S. are plentiful and complicated. This video can help the audience get started in understanding food safety. An additional video on Hawaii Agriculture with a focus on

aquaponics was produced to rally support from the government, investors and consumers for the aquaponics industry to grow. Viewers of the videos found them very helpful. The videos are posted online. Links to the videos are provided in the “additional information” section at the end of this report.

Objective 4: Increase the number of commercial aquaponic farms from 6 to 12 by August 2014.

2 new aquaponic farms started operations during the project timeline. 6 groups of people have contacted the team about starting an aquaponic farm since the completion of the aquaponic product conference in March 2014. Some of them are doing small scale commercial farming in their backyard currently and working with food distributors who accept small quantities of products. They want to start small before investing big lump sums in bigger operations. Others are in the concept and planning stage. The Aquaculture & Livestock Support Services promotes aquaponics continuously to potential investors and new farmers, gives interested people a tour of Mari’s Gardens, the largest aquaponic farm in Hawaii, and provides them with the information packet distributed previously through the 5 workshops. The hope is there will be more aquaponic farms in Hawaii. However, it is not sure when these people will receive all the funding and government permits and secure the land to set up full-blown commercial farms.

Objective 5: Increase communication between buyers and producers by establishing an online response center on AquacultureHub by August 2014.

A report including all the major food wholesalers and aquaponic farms in Hawaii with contact information is posted on the Hawaii Department of Agriculture website. The link to the report is provided in the “additional information” section at the end of this report. Wholesalers and farmers can utilize the report to initiate contact with each other. A result of the project is the realization that it is better to provide enough information to facilitate the communication between buyers and farmers, such as posting this report online, instead of radically changing the traditional way that buyers and farmers interact.

Contribution of Project Partners

Hapa Farms and Mystical Video Productions were selected to work as subcontractors.

Hapa Farms, a very experienced aquaponic farm that provides disease-free tilapia fingerlings and aquaponics training to farmers and schools, provided commercial aquaponics training to more than 20 students. Reyn Horner and Erin Nishimura, owners of Hapa Farms, carried out a very successful training program. Students received a four-hour training every Saturday morning for 12 weeks. The curriculum was well designed and thorough. The hands-on training was helpful for students to practice the knowledge acquired.

Mystical Video Productions was able to finish three long videos with a very small budget. The result was 3 high-quality, informative videos that provide training to existing and new farmers on marketing, food safety and general knowledge of Hawaii Agriculture.

Results, Conclusions, and Lessons Learned

The program has helped existing aquaponic farmers expand their markets and encouraged them to increase production and add new varieties of crops. The buyers and consumers learned more about aquaponic products available in Hawaii through participation in the project’s conferences, press releases in newspapers and

television and workshops. The project successfully delivered market knowledge to existing and beginning aquaponic farmers.

A local independent nonprofit organization, ThinkTech, was invited to attend the aquaponic products conference. The President was so inspired by the technology and Hawaii aquaponic farmers innovative spirits, he organized a forum featuring high technology in Hawaii Agriculture and started a weekly TV program featuring Hawaii farmers. These boosted the image of agriculture/aquaculture in Hawaii and help farmers market their products. The students in the commercial aquaponics classes helped a local high school to build 2 relatively large backyard aquaponic systems as part of their hands-on training. The students at the school can learn the science of aquaponics, fish, and plants by maintaining the systems daily.

If the project was done over, a focus would have been placed on communication with food wholesalers from early on to get them to sign up for the aquaponic products conference. Maintaining good relationships with food wholesalers is very important to the project's success. They are an integral part of the local food system, a very important link.

If other states were to do the project, it is recommended to work with an experienced food wholesaler in the beginning of the project. It is also recommended to watch high-quality videos on agriculture and food before looking for a video production company to do the work so clear expectations of video qualities can be written into an RFP.

Evaluation

The evaluation methods for the five objectives and the results are as shown in the table below.

Objectives	Evaluation Methods	Targets	Results	Meeting Objectives (Yes/No)
1. Increase buyer awareness	Compare buyer awareness before and after the aquaponic product conference using surveys.	10 buyers had some knowledge.	50 buyers gained in-depth knowledge.	Yes
2. Gather information on buyer preferences	The number of buyers being interviewed and the details of information they share about their buying habits	Such information was not available in the HDOA database.	Information in more than 10 categories was collected, such as interisland shipping charge and minimum sales quantity. 42 products' farm gate prices were collected.	Yes
3. Increase farmers' knowledge on selling	The number of workshops and video courses; the number of workshop attendees; pre-workshop and post-workshop surveys to compare knowledge gained by the participants; workshop handouts	Fragmented, inconsistent and word-of-mouth market information. Just a few bigger farms had better data.	5 workshops were held on 5 islands. 110 attendees. 2-hour workshops provided detailed and thorough market information and sales training. Great feedbacks from the attendees.	Yes

			3 high-quality training videos on marketing, food safety and Hawaii Agriculture were made to provide training on an ongoing basis. A 16-page information packet in PDF is ready to be sent out upon inquiry.	
4. Increase the number of aquaponics farms	Comparison of the number of farms before the project and after.	6 farms	2 new farms added. 6 groups of people inquired about starting a new farm. They are at various stages of the process.	Yes
5. Build an online buyer-farmer response center	This objective was changed to create a list of major food wholesalers and aquaponics farmers and their available products, which is more compatible with Hawaii's business practice in this field. Evaluate the number of food wholesalers and aquaponics farms included on the list.	Such information was not available in the HDOA database.	20 food wholesalers and 8 aquaponic farmers are included in the list. The available product information is also included.	Yes

Current or Future Benefits/Recommendations for Future Research

The project produced 3 videos to continue the training of potential new farmers from Hawaii and in the U.S. on aquaponics farming marketing and food safety. The videos are very helpful to newcomers in the industry because they provide a good framework for beginners, take their hands through the process of growing and selling products, and meeting the government's food safety requirements, therefore, reduce the risks of a new aquaponic farm may have. New farmers can start their businesses with greater confidence, better knowledge of many aspects of the business, use key industry contact information, and be prepared to meet the demands of food wholesalers and the consumers. The 16-page information packet is ready to be sent to anyone in Hawaii or the U.S. who wants to learn more about aquaponic farming. The project was designed to share the useful information with the nation so more people can benefit.

Total vegetables consumed in Hawaii in 2015 was estimated to be \$246 million, an extrapolated number. This big market potential is here for Hawaii farmers to take advantage of. The common aquaponically grown vegetables include different types of kale, lettuce, beets, micro greens, green onion, cilantro, Chinese Pak Choy, watercress, cucumber, tomato, radish, Swiss chard, eggplant, arugula. All the major aquaponic farmers received more orders after the aquaponic products conference was over.

The promotional work done through the project lifted the public profile of aquaponic farming, the aquaponic farmers, and their products. Food wholesalers showed strong interest in this newer method and would like to promote the aquaponic product. Hawaii consumers also learned more about aquaponics. It is almost everyone's knowledge now in Hawaii that aquaponics is a smart system to produce food. It is sustainable, water-saving and interesting.

The project increased the HDOA staff's knowledge about farmers, food wholesalers and grocery stores. A good business relationship has been established between the team and food wholesalers, which lends potential for future collaboration on statewide projects. The training videos, workshops and information packet can help existing and new farmers build trust in the HDOA's ability to assist farmers in production and selling, which is helpful for the HDOA's role as a promoter of growing agriculture in Hawaii. The project team was able to hone their presentation and video production skills for the purpose of sharing knowledge with farmers effectively.

Recommendations for future research: aquaponics is a sustainable way to produce large quantities of vegetables and fish. The return on investment (ROI) data and market survey information are created to share with the rest of the forty-nine states. Interested people can use this model to find out their own ROI information using local data. If they can also share such information, it will greatly help entrepreneurs across the U.S. to start new aquaponic farms.

Project Beneficiaries

The group benefitted from the project the most is the aquaponics community in Hawaii that is comprised of 4 large commercial aquaponic farms, several smaller commercial farms and many backyard aquaponics enthusiasts (over 100 enthusiasts by estimate) who have the potential to go commercial once they have all the funding, land, and equipment. The 4 large commercial aquaponic farms employ anywhere from 4 to 50 employees, harvesting hundreds of thousands of pounds of produce per year.

Another group is the food wholesalers in Hawaii. They learned a new production method that is good for the environment, which resonates with many environmentally conscious consumers. They also learned about the key players in the aquaponics industry and tasted the products. They know whom to go to when their customers ask for more local products.

Potential investors looking for good projects are also benefited from the information collected by the project. They have a much-validated project idea to start with, thereby having less risk when they do invest in aquaponics.

Local consumers and visitors to Hawaii enjoy the fresh, nutritious aquaponic products. The more aquaponic farmers there will be, the more fresh produce people can enjoy.

Additional Information

Food wholesalers are an integral part of the food industry in the U.S. and many other countries. They can help farmers sell the perishable products to many retailers and restaurants fast. A farmer can sell directly to restaurants. However, farmers benefit greatly from food wholesalers' existing sales network (usually much larger than an individual farm's sales network), storage and delivery system. Farmers can achieve economy of scale faster and focus on production instead of distribution. Major food wholesalers' purchasing managers' information is posted to the Hawaii Department of Agriculture website for the public to use.

<http://hdoa.hawaii.gov/ai/wholesalers-aquaponics-2/>

The aquaponics information packet is attached as a PDF file. Below are the links to the 3 movies.

1. How to Market Aquaponic Products (6 parts)

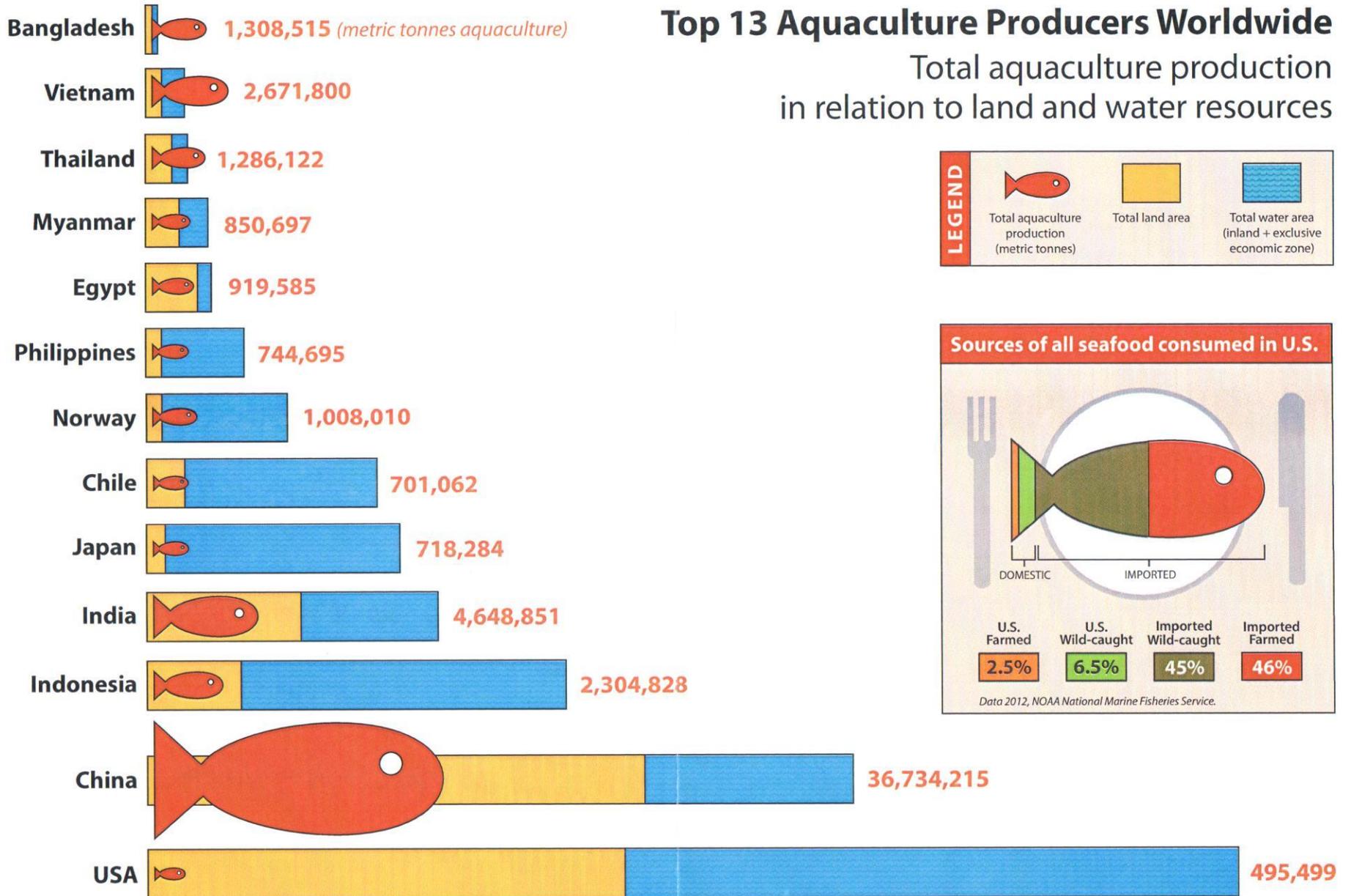
<https://vimeo.com/147830269>

2. How to Go through the Food Safety Process (5 parts)

<https://vimeo.com/152796156>

3. Hawaii Agriculture: Past, Present and Future

<https://vimeo.com/154941390>



2010, UN Food and Agriculture Organization

Aquaponics Market Research and Development Program Buyer Interview Questions and answers

April – May 2014

1. What are the price points of products you buy? For example, lettuce, green onion, pork, beef, and chicken?

The answers are included in the Wholesale Price List report.

2. Are you paying more for local products?

Depending on the varieties and timing. Some farmers try to match imported produce price from the mainland plus shipping; others want to charge a premium.

3. What are your food-safety requirements?

Seafood products shall use food safety guidelines in the Hazard Analysis of Critical Control Points (HACCP) plan. Some produce wholesalers require the farmers to adhere to the Good Agricultural Practices (GAPs).

4. What level of insurance coverage do you ask your vendors to have?

\$1 million insurance coverage to start with.

5. Is buying local a priority for your business?

Some wholesalers respond to chefs' request of sourcing locally and try to find more local farmers to work with; others serve customers whose main concern is cost. Buying local is not a priority for this type of wholesalers.

6. How many pounds of fish do you buy per month?

Some seafood wholesalers require 100 pounds of fish delivery by the farmers as a minimum per week; big seafood wholesalers can take 1000 – 5000 pounds of fish per month or more.

7. What do you think the advantages of buying local are? What are the concerns you may have with local products?

There is a trend among chefs to source locally. If a wholesaler caters to such a demand, he may get more business. The local products are fresher. The concern is whether a farmer can provide the consistent supply in the long term once they form a business relationship. Local productions are far from enough. Weather or other factors can disrupt production on a farm, which would affect the supply.

8. Do you have any particular packaging requirements regarding certain products?
Wholesalers want farmers to use new, compact boxes to transfer the products. Recycles boxes main contact bacteria. Because it is more expensive to buy packaging materials in Hawaii, the wholesalers emphasized this point.

9. Are there any specifics on delivery time, date, and location?

Products shall be delivered in a refrigerated van to keep the products in the cold chain. Some wholesalers require daily delivery while other just need once or twice a week delivery. If farmers don't have a refrigerated van, some wholesalers can offer pick up at an additional fee.

10. What are the interisland shipping rates?

It is \$0.15 - \$0.20 per pound by ocean freight (Young Brothers is the main service provider.), \$0.60 - \$1 per pound by air (Aloha Cargo is one of the service providers).

Additional tips offered by the food wholesalers in Hawaii:

1. Some wholesalers want to represent a farmer exclusively.
2. Some wholesalers think that common staples need to match mainland delivered prices.
3. The ideal size of tilapia to be filleted is over 2.5 pounds.
4. Selling Manoa lettuce and basil to the US mainland may yield good profit. These two products from Hawaii are in good demand in the mainland.
5. Farmers need to use commercial kitchens to process fish. They cannot process fish in a home kitchen.
6. The famous local chain restaurant, Zippy's, is very supportive of local sourcing. They are willing to pay a premium for local products.



Future of Hawaii Agriculture

Developing Sustainable Aquaculture in Hawaii

**Aquaculture & Livestock
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DEPARTMENT OF AGRICULTURE

HDOA Commercial Aquaponics Workshop



Developing Sustainable Aquaculture in Hawaii

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HDOA Commercial Aquaponics Workshop

Aquaponics Concept

Commercial Aquaponics Farms in Hawaii

Hawaii Food Production

Aquaculture in Hawaii and the U.S.

Economics of Aquaponics

Aquaponic Products Conference

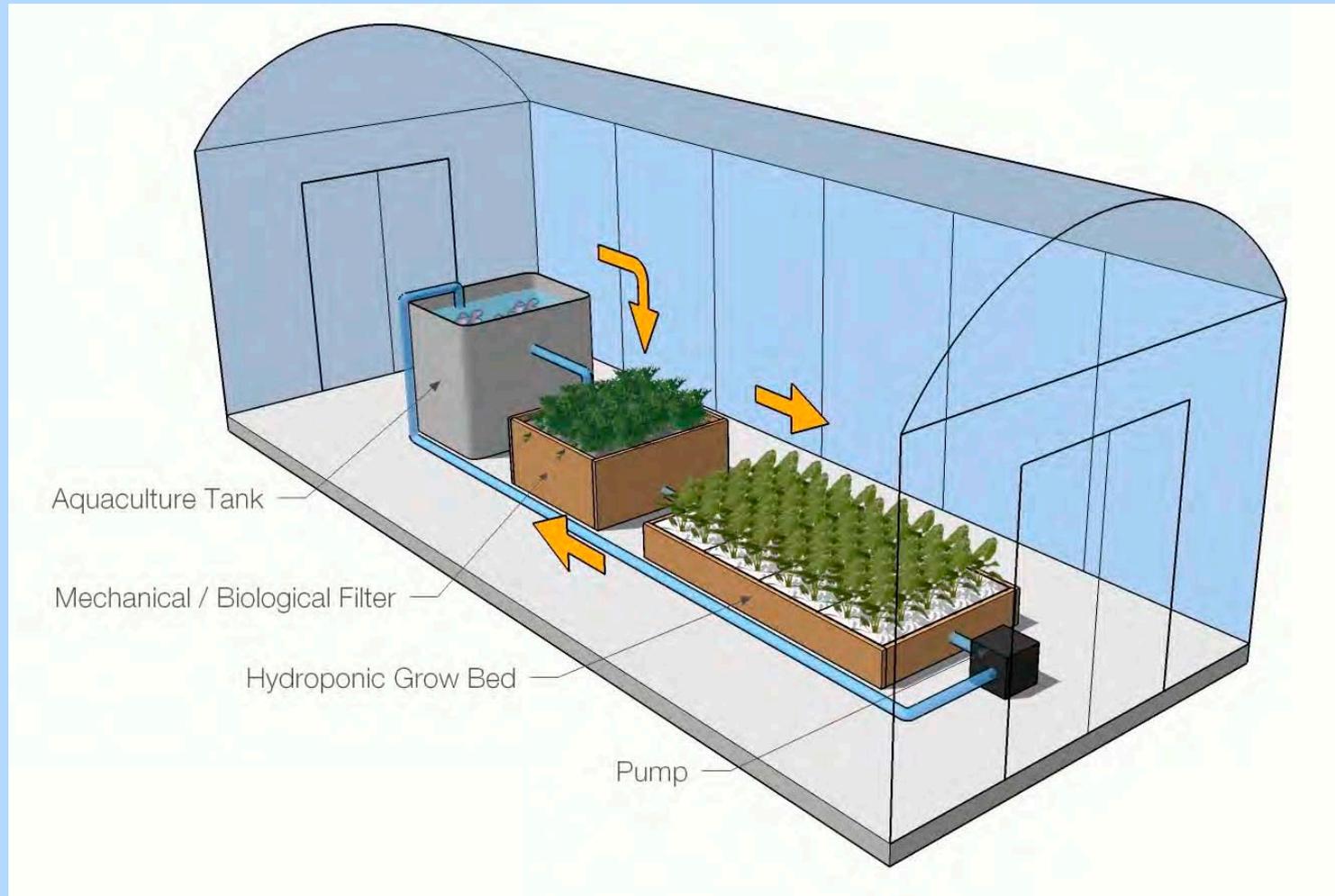
Wholesaler's Feedbacks

Food Safety

Aquaculture Venture Capital Firms

Startups in Food Business

Conceptual Aquaponic System



Commercial Aquaponic Farms in Hawaii

1. Ecoponics
2. Hapa Farms
3. Ili'Ili Farms
4. Kunia Country Farms
5. Mari's Gardens
6. Nalolicious Farms
7. Olomana Gardens
8. Olokai Hawaii

Hawaii Food Production

- We import 85-90% of the food
- Variety of local food

Aquaculture in Hawaii and the U.S.

- More than \$11 billion seafood deficit a year
- Smallest production comparing to other countries on the chart

Economics of Aquaponics

- One-acre of aquaponic production area
- 20% is fish production, 80% is vegetable production
- Initial investment is \$211,000
 - (Owner and investor money \$111,000, loan \$100,000)
- 19,800 sqft grow bed, 14 tanks.
- 2.25 heads of lettuce per sqft, 6 weeks growing cycle.
- 20 heads of lettuce per sqft per year.
- Annual production: fish, 32,358 lbs; lettuce, 127,413 lbs.
- ROI: 33% and 50%

Hawaii Aquaponic Products Conference Help Farmers Expand Markets



Developing Sustainable Aquaculture in Hawaii

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Wholesaler's Feedbacks

- Welcome more local products.
- Consistent quality and quantity is key to win business.
- Wholesale price list

Food Safety

- Food Safety Audit on farms
- HDOA Quality Assurance Division
- Organic Certification
- HACCP for Processing
- Private Companies Who Can Help with Food Safety Audits and Training
- Real Farm Daily Practices on Food Safety
- CTAHR and Maui Food Innovation Center Courses

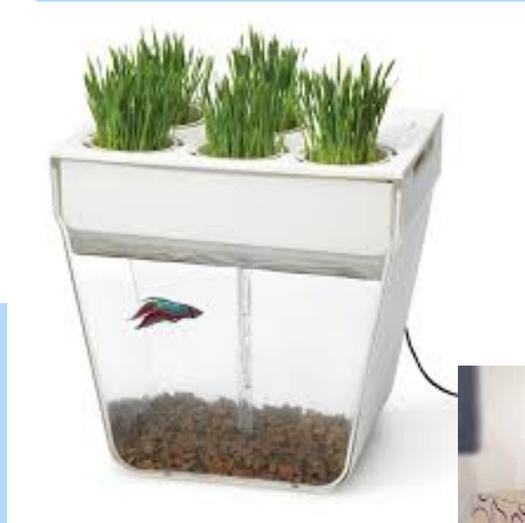
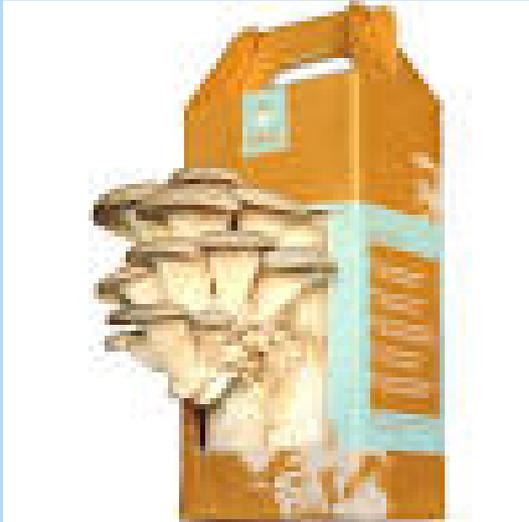
Aquaculture Venture Capital Firms

- Cuna Del Mar
- Aquacopia
- Aqua-Spark
- CBO Financial
- Fish 2.0 Competition
- Hawaii Investment Ready
- Watch Shark Tank to Learn Pitch Techniques

Startups in Food Business

- Blue Apron, Plated, HelloFresh
- Humpton Creek (Just Mayo)
- Sweet Green
- Chipotle
- Mushroom Garden and AquaFarm
- Online grocery business will grow
- US grocery industry trend: value seeking during and after recession; convenience not a key factor.

Agriculture and Food Startups



Developing Sustainable Aquaculture in Hawaii

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Agriculture and Food Startups



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What Will We Eat?

**70% more food needs to be produced
globally by 2050**

(Food and Agriculture Organization – United Nations)



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