AquaponicsUk

Building the FARM:shop aquaponics system

FARM:shop

20 Dalston Lane, London E8 3AZ

about FARM:shop

The FARM:shop project involves a wide range of collaborations, from the coordinators, Something & Sons, to Hackney Council the building provider, Aquaponics Uk and a number of other sponsors that have all made it possible. Already the FARM:shop Dalston has gone from a 1 year 'meanwhile lease' to a three year commercial contract, demonstrating how disused space can be turned into a useful resource.

The FARM:shop conceived by Something & Sons, who with strategic partnerships has delivered a wide range of urban farming systems into the heart of dalston an allowed the public to see which best fits with them.

Meeting and office space

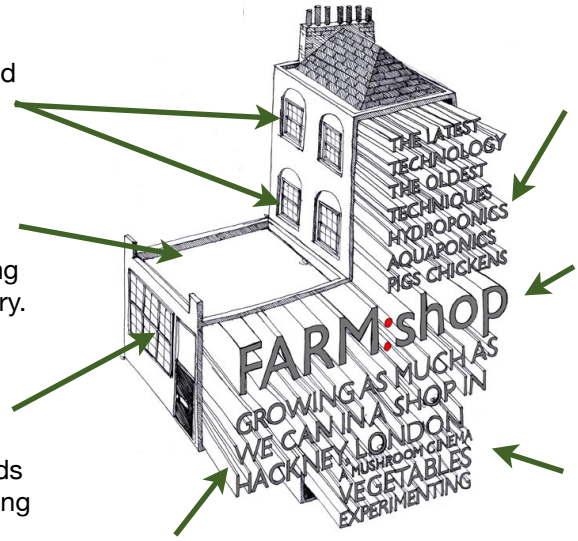
over two levels there is both office and meeting space available providing a hub for creative industry

Chickens on the roof

Hens laying happily and demonstrating how easy it is to grow your own poultry.

Aquaponics system

A closed loop aquaponics system, growing fish, prawns, herbs and salads whilst doubling up as a cafe/networking space.



Hydroponic room

a grow room with tomatoes and peppers with air cooled high intensity lighting.

Polytunnel

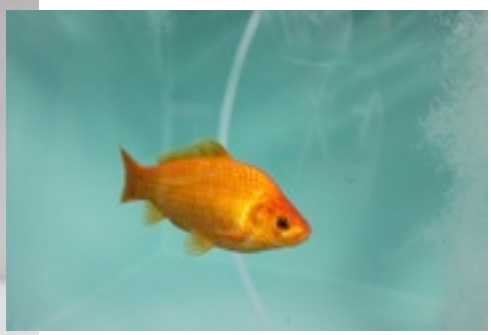
Raised beds with kales and salads in winter and tomatoes and peppers in summer. A cafe in the day and cinema at night

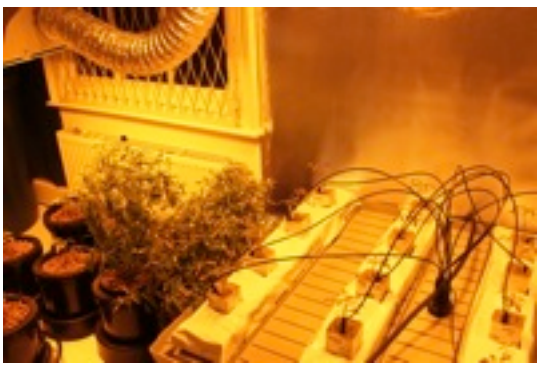
Mushroom cultivation

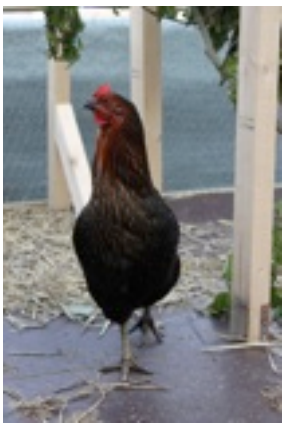
In the basement a variety of mushroom species will be grown for use and sale with the shop/cafe

Kefir Farm

A light hearted experiment to track the culture of Kefir bacteria within the urban culture of London.







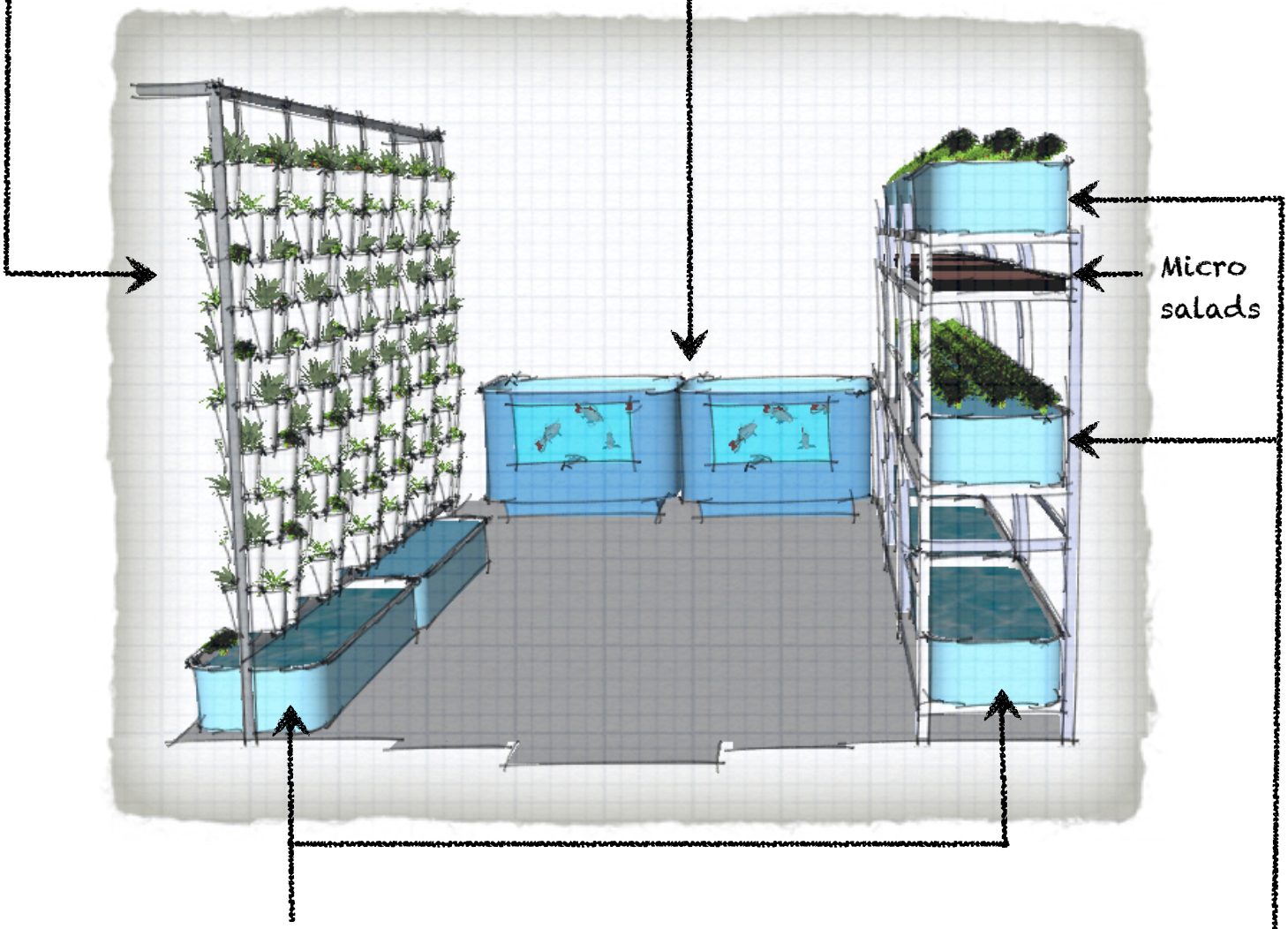
how the aquaponics system works...

Herb & Tea Towers

40 plants per square foot in this innovative, rotating vertical growing system. Stocked with cut and come again herbs such as mint varieties & lemon balm for the freshest herbal tea as well as strawberries and other herbs for the onsite cafe.

Fresh Fish

Each fish tank holds 80 or so Nile Tilapia, a delicious freshwater fish that is easy to grow and is happiest in crowded situations. It is also omnivorous and will eat off-cuts, kitchen scraps and worms, so it's sustainable too.



Shrimp & fry Sumps

The four sump tanks will be home to Giant Freshwater Prawns who scavenge for algae and wastes and provide a tasty bit of extra protein, they'll also be stocked with tilapia fry to on-grow to a fingerling stage.

Salad & Herb Rafts

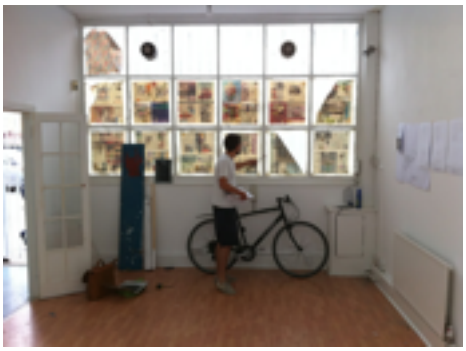
Deep water circulation hydroponics. Plant roots are immersed in oxygenated, nutrient rich water. Allows high densities and rapid growth of leafy greens, cucumbers, courgettes and melons. Multiple levels maximizes use of space.

Building the system

Design brief:

Something & Sons offered us the opportunity to create an aquaponics system as part of the innovative and exciting urban farming project - FARM:shop. Over a period of some months a system design was created based on their requirements to create a multi use space where the majority of the floor area was available for the cafe or for talks and debates.

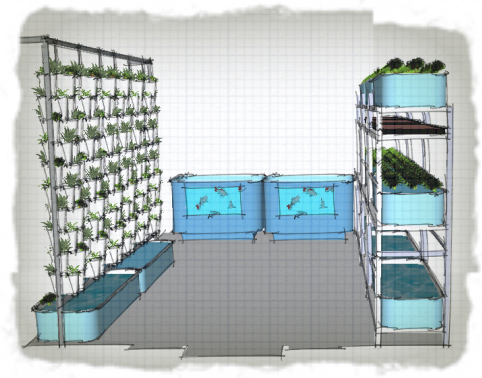
Aquaponics UK then created a system design that was intended to be productive whilst being exciting, different and ultimately to provide an example of how this can be scaled up to more meaningful food production levels in warehouses and disused spaces across the UK



The vision..

We had the privilege of being involved right from the conceptual stage of the project and before even the keys had been given and the lease granted.

Through this process we managed to establish a relationship with both the guys at Something & Sons, but also with the space itself in order to try and make very conscious use of space and the resources available



System Design..

The system design evolved over six months of planning and numerous iterations ensured that the best possible mix of food production with versatile use of floor space was achieved. We settled on the idea of mixing a vertical, easily maintained, floating raft system, combined with the more novel rotating towers, all linked together to form an aquaponics system in the most unlikely of situations, the front room of a disused shop in Hackney, London.

Turnkey Installation..

After the period of planning and system design, there was a 2-3 day period of consolidating equipment on-site. The aquaponics system was then installed over the following 12 days.

Aquaponics UK offer bespoke and turnkey installations to suit a variety of applications from commercial farm level production, to inner city edible initiatives.

Sowing the seeds..

During the installation process, it's also important to plan the initial planting schedule and to start seeds off, to be ready when the system is running.

We provide support to guide you through the initial phases of planting and stocking your system with fish, as well s offering a variety of training options.

Installing the shelving system

The shelving for our FARM:shop aquaponics system provides a versatile and load-bearing solution and the dimensions of each bay is 1800mx600mm which fits perfectly with one of our range of six fiberglass growbeds.

Initially a wooden structure was intended however due to loadings of over 1000kg per bay, the precautionary principle was taken.

Installing the growbed tanks

The growbed were installed into their respective positions.

Our fiberglass grow-beds are available in a wide variety of different sizes and colors and are manufactured on a farm near Hull by Paul Bowers of Fiberline.

We currently use glass fibre mat made from recycled glass, however we exploring alternative materials such as plant fibre mat and natural resins.

Installing the vertical tower scaffolding

We designed the rotating tower system with an easy to assemble scaffolding system in mind. We used Type 6 scaffold tube, to create the frame for the rotating towers. At the top and bottom of each tower a bearing ensures frictionless turning powered by the inflow water entering the top of the tower.

the Pipework....

We love pipework, there is no denying it or hiding from it... its form and its function... endlessly intriguing...

The pipework is the part that connects everything together to finally produce a system, in this case installed in PVCu and in accordance with hydraulic modeling during the design phase.

the pipework complete and sealed.

finalising the installation..

Once the individual components had been connected together with the pipework, a working system starts to emerge. Whether 4” or 3/4”, the pipework was designed to take the required flow and to join up the various elements of the aquaponics ecosystem.

Once all the tanks were in place and the pipework connecting them all was sealed and cured, it was a case of that slightly spooky feeling again when the CAD drawings that we’ve been working on for so many months, suddenly start to manifest themselves and our design becomes reality.

The aquaponics system at FARM:shop is designed to be participatory and demonstrative, whilst providing a viable model for small scale inner city growing and an insight into how this could be scaled up for more commercial scenarios. The remit was to provide as much central floor space as possible for a multi use space for the cafe and networking events whilst providing as much production in the periphery of the room as possible.

The multi tiered approach is the first in the Uk and originates in the United States, Milwaukee to be precise and currently being practiced by both our partners Sweet Water Organics and Growing Power. However our systems differ in that they use 300mm deep floating raft tanks and a 3w rotating screen system for solids removal.

The system is designed to be modular, scalable and transferable for a wide variety of circumstances

filling the system

The tanks were thoroughly cleaned and washed out to remove any residues before being filled with tap water.

The tap water was then circulated for approximately 5-6 days to allow for the chlorine to oxidize and for the water to be safe for the stocking of the first fish.

It took over 8 hours for a single hose to fill over 5000ltrs but eventually all the tanks and pipe work were full..... without a single leak !

the aeration system turned on...

The aeration system consists of an energy efficient diaphragm pump, designed for constant duty and oxygenating the whole system for only 80w.

There are 12" disc diffusers in each of the fish tanks and two 75cm ceramic diffusers in each of the growbeds.

The location of the air stones is designed to help aid the removal of solids from the tanks.

lights installed & seedlings planted onto rafts....

The water has now been left to circulate and aerate over 4 days, at which point the floating rafts of the middle layer was planted with small seedlings and the energy efficient lighting installed on the middle layer. The water then had beneficial bacteria added and was allowed to circulated for a further 24 hours.

the start-up phase begins...

An single, high efficiency pump provides circulation for the system with a power consumption of approximately 120w.

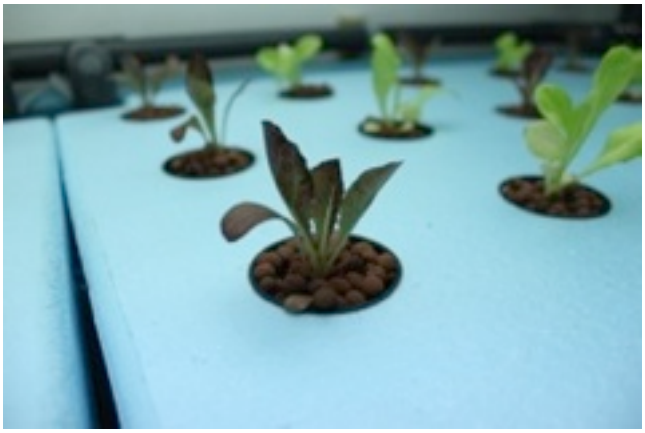
In order to kick start the system and also for the purpose of demonstration during the opening, two goldfish were stocked into one of the tanks to start the cycle off slowly.

The goldfish, promptly named pumpkin & custard by becky, are members of the carp/cyprinid family but suited to slightly colder water temperatures than the eventual occupants, tilapia, who prefer it slightly warmer water.

the rotating herb towers

Towers will be filled with a variety of perennial herbs, salad and fruit.Three of the towers will be filled with different varieties of mint (apple mint, ginger mint and peppermint) and will provide fresh supplies for mint tea in the cafe.

The towers will have 40 plants per square foot and two towers (80 plants) will rotate around a single light source, drip fed from above, draining into the sump below and filled with 8-16mm expanded clay pebbles.



floating rafts

On the multi level shelved system the two levels of growbeds use floating rafts to support the plants above the nutrient rich water, they also insulate the tanks and prevent light entering the water.

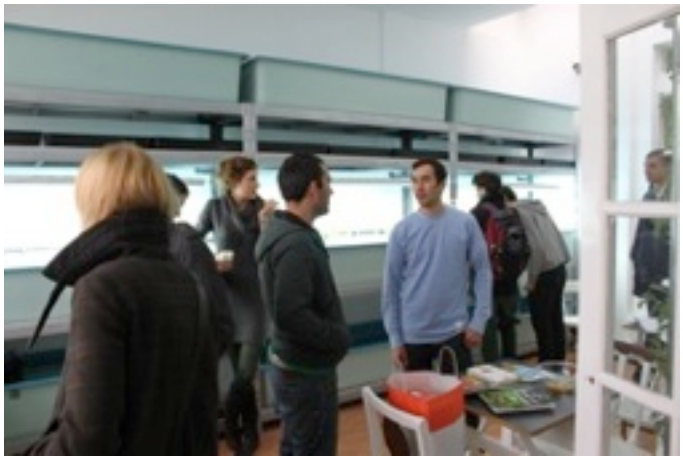
The rafts are made from 50mm extruded polystyrene and are fully reusable, whilst not the most sustainable material choice its currently the most affordable and long lasting, however we are actively developing more sustainable options for the future.

Holes are cut into the rafts to take the net-pots, plugs from propagators are transplanted into them after approximately 21 days and depending on crop type are either put into larger net pots and filled with 4-8mm expanded clay pebbles or dropped directly into smaller ones.

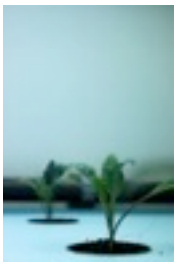
Floating raft culture allows the plants to have access the oxygenated water and nutrients which produces rapid growth of high value salad and herb crops from the nitrogenous wastes of the fish. In larger systems the rafts can be floated down long channels to minimize labour input and maximize efficiency of production.

The FARM:shop in itself demonstrates the important trade-off between public engagement and access and the ability to produce lots of food, sustainably, from a small foot print.

the opening...



On the 31st October the doors of FARM:shop opened to the public for the first time.



An opening party was held to invite the local community into the FARM:shop to see how the vision is progressing and being realised.

The FARM:shop provides the opportunity for the wider public to engage in a number of different food growing systems from aquaponics to hydroponics, soil growing, wormeries, mushrooms to chickens and pigs.

Aquaponics UK are fitting into the overall picture by donating the aquaponics system and supporting its operation and helping where possible to link together the resources of the FARM:shop as a whole.

second phase ... the next steps

1. Installation of the horizontal light movers for the top level.
2. Installation of energy efficient propagation and micro-salad lighting
3. Installation of movements to make the towers rotate... first of a kind so will need some fine tuning.
4. heating up the system slowly
5. removing pumpkin & custard and maintaining temperature at around 25 degrees.
6. preparation for first tilapia stocking
7. training and support

with a little help from our friends....

Hydrogarden - donated the media and the lighting. Hydrogarden have sponsored us for the last 2 years to co develop mini systems and it has to be said their support for our cause has been unswerving.

Oase Living Water - donated the pump, and rotating filter screen.

Big Dug shelving - donated the shelving for the floating raft, sump and micro-salad shelves.

Sweet Water Organics - our partners in the States. We are currently co developing a number of systems with them, and they continue to provide constant inspiration.

Rachel & Richard Nunn - Rachel and her husband Richard shared the vision of what we were trying to achieve and offered £1000 towards the costs of the system, with no strings attached... For that we are truely grateful.

Sam, Andy & Paul from Something & Sons - for the opportunity to demonstrate what we're about.. and for their support through the process... we hope to work and grow with you....

Alex & Tiffany - for your help with the painting, shelving and planting as well as giving us a bed, food and support.

Becky Bainbridge- since coming to work for Aquaponics UK, you've been an inspiration, an academic in your own right, a pipe cutter, a worm enthusiast and all round star... i thank you for the long nights and early mornings.