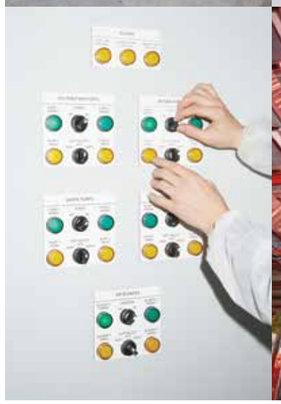
# THE FUTURE OF FOOD?



Could a process being perfected in an East London warehouse, involving 12 tanks of fish and vast trays of salad leaves, change the way we produce our food? *Tim Smedley* reports from the cutting edge of aquaponics. Photography by *Luke & Nik*

In their full-body protective suits and spotless white wellies, Kate Hofman and Tom Webster don't look like farmers. And this doesn't look like a farm. GrowUp, their aquaponic food business, is one of a long line of industrial units in Beckton, the untrendy end of East London, sandwiched between a wallpaper warehouse and a construction company. Visitors are asked to sign declarations that they carry no germs or foreign soils before entering.

"These are the little ones," says Webster, gesturing proudly to the tiny black fish swimming in giant blue water tanks. "They are black tilapia, really popular in Asian cooking... The temperature in the room is a steady 20 degrees, and the water is kept at 25 degrees through an air source heat pump," he explains. "We can also use the excess heat from the lights next door. Each tank is 3,000 litres and we've got 12 tanks, which will each have 250 fish per tank at full capacity."

"Next door" is a separate, equally large room where the farm's other produce is grown. Eight-metre-long metal growing trays are stacked, 10-high, up to the roof, each containing small herb and salad leaves which glow pinkish-blue under the light of LEDs. Water is circulated between the two rooms and – here's the clever bit – the plants are fed by fish poo alone.

"It has essentially everything a plant needs," explains Webster, who prefers the term "poo" to "waste". "Phosphorus, potassium, nitrogen – all the nutrients and micronutrients you need for leafy plant growth. Nitrogen is also abundant from the ammonia fish excrete from their gills. ▶

◂ We convert the ammonia – which is harmful to the fish and not useful to the plants – into nitrogen the plants can then absorb."

It may feel a million miles away from the rustic idyll we like to associate with the production of our food, but this is the pioneering forefront of urban farming. And it could be the future of food.

"Looking at the bigger picture of agriculture, energy is an issue, water is an issue, we're running out of space, and the soil we grow on is getting more and more depleted of nutrients," says Webster. "By farming in disused buildings on the fringes of cities, it's lessening that burden and creating employment." When it is fully operational, GrowUp's Beckton farm will produce 20,000kg of salad and 4,000kg of fish a year.

The system works by flooding and draining periodically, explains Webster, who is glowing an unsettling night-club pink in the plant room. "Every time a tray needs watering, the pumps switch on, valves release the water to fill up the tray to a couple of millimetres, the mats the plants are grown in [made from recycled carpet] get wet, then the water switches off and drains back into the tank next door, and that's it." About 200 to 300 litres of fresh water a day are put in across a 40,000-litre system. There is just short of 800 sq m of growing space. "It is," he argues, "the most efficient way of growing food".

Hofman and Webster met in 2013, then aged 27 and 24 respectively. They were both pursuing postgraduate studies in the niche field of urban farming (hers from Imperial College London, his from King's).

"We were introduced by a mutual friend who was sick of hearing us both talk about this 'aquaponics thing', so he thought it would be better if we talked to each other instead," Hofman laughs.

Hydroponics – a process of growing plants indoors without soil, using water and nutrients delivered directly to roots – is already well established. The vast majority of UK supermarket salad leaves, tomatoes, peppers and cucumbers are grown in this way, many from the 91-hectare Thanet Earth greenhouse complex in Kent. However, the process requires additional chemicals and – with greenhouses that need heating and sodium lighting – hefty energy bills.

The new concept of commercial aquaponics, argue Hofman and Webster, has a much-reduced environmental impact. Companion farming fish and crops dates back to the Aztecs, but it took until the 2010s, in Chicago, to move it indoors at any scale. In the UK, only eco-smallholdings have so far attempted it, and the only European aquaponics farms of note use purpose-built greenhouses. GrowUp's model, by contrast, is to fit out empty urban buildings, use no chemicals, employ LED lights, source 100 per cent renewable energy and, crucially, be based within five miles of its customer base in a dense urban area.

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Hofman persuaded Webster in 2014 that they should both quit their consultancy jobs and start doing rather than talking. Following a £16,500 Kickstarter campaign, they first converted a shipping container into a mini commercial aquaponics farm called GrowUp Box, perched on the rooftop of an East London shopping centre.

"We both knew from the start that what we were really interested in was a commercial scale," says Hofman. "The Box could have broken even but that was never the intention – really, the value in building it was to be able to show in an exciting visual way how this method of food production works and get tangible feedback from customers about the quality of produce and pricing. That proved really important to our investors."

Hofman's MSc thesis had focused on how to make urban farming commercially successful in London. GrowUp's business plan was almost ready-made. They raised £1.2m in their first finance round – about £300,000 from Innovate UK, the government innovation funding quango, and £900,000 from a social impact fund called Ignite Social Enterprise. This money covered the build of the [Beckton] farm – about £750,000 – and the shortfall in working capital until the farm is fully operational. This includes paying themselves a salary, plus employing seven others.

In early November, GrowUp made its first deliveries. Early crops include baby kale, rocket and pea shoots, plus several types of basil grown to order for a Thai restaurant group, Rosa's. The holy basil is sweet with a hint of aniseed; the sweet Thai basil is unexpectedly minty, like toothpaste; and the ordinary European basil is delicately aromatic, with surprisingly large leaves.

Hofman and Webster are acutely aware of the issues they want to address. Between 2009 and 2012, food inflation ran at 32 per cent. In urban areas, people spend 30 per cent more on food, yet consume fewer calories than their rural counterparts. Most food spoilage happens in transportation from the fields. If cities could grow their own food, these problems could be improved.

Webster points out that it takes about 1.7kg of feed to create a kilo of tilapia, whereas with salmon, it's "more like 3kg of feed to a kilo".

**Previous pages (left):** (clockwise from top left) GrowUp's co-founders Tom Webster and Kate Hofman fishing out tilapia for routine health checks; hard-wearing wellies are part of the GrowUp uniform; Webster inspects the sweet peas; the control panel for the facility's pumps; **(right)** tilapia at feeding time

**Below:** Webster and Hofman checking and sampling salad leaves

**Facing page, from top:** assessing the water; measuring a tilapia

"Producing protein," he adds, "close to the source of consumption in a sustainable way, with an animal that has a high protein conversion will be our most positive environmental impact."

But Hofman and Webster also recognise the business opportunity that comes with all this. "Huge out-of-town supermarkets are downsizing," says Hofman. "We've seen shopping centres with whole floors of empty spaces that used to keep stock, but now everything is done online... these [spaces] are perfect for urban farming." The Beckton unit was dormant for years before they took over the tenancy.

The "field to fork" freshness also meets a key customer demand. At Rosa's Soho restaurant, an engaging bustle of Thai-western fusion, chef and co-founder Saiphin Moore, has an inimitable knowledge of Thai produce thanks to her upbringing on a farm in rural Thailand.

"The holy basil and sweet basil that we import from Thailand can take over a week to reach us and is sometimes already wilting," says Moore. "But this [from GrowUp], you order, they cut it for you in the morning and deliver to you the same day. The taste is much better, stronger." She also has plans for the tilapia, a commonly used fish in Thai cooking, to replace sea bass on the menu: "We will use the whole fish, wrap them in salt and grill them."

Farm Drop, a London grocery-box delivery scheme specialising in local produce, now includes GrowUp produce among its online options. Founder and chief executive Ben Pugh says he doesn't yet know what his organic-oriented customers make of vegetables that have never seen the sun but does know "that it's really important that we support [GrowUp], because they're showing that we can change the food system". "And I can't source it fresher," he adds. "One of our purchasers tried the GrowUp basil and described it as the best they'd ever had. It was still good in the fridge three weeks later."

Farm Drop has also sourced produce from another London-based urban farm that launched earlier this year. Growing Underground's home is a disused Tube tunnel, just metres away from the Northern Line at Clapham North. It uses hydroponics not aquaponics but has the same ultra-local credentials and the backing of Michelin-starred chef Michel Roux Jr.

"GrowUp and Growing Underground are blazing a trail," says Pugh. "Let's see where that takes us. As long as it's a delicious product, we're keen to get involved."

The wider market could be harder to convince. Richard Gladwin, who runs The Shed in Notting Hill and Rabbit in Chelsea with his brothers, has proud green credentials: The Shed holds a three-star "Food Made Good" rating from the Sustainable Restaurant Association. He mostly sources from within a tight radius of the family farm in Sussex.

**'We've seen shopping centres with whole empty floors – perfect for urban farming'**

Kate Hofman, GrowUp co-founder

"They say we are all going to be eating locusts for our protein as the population rises," he says. "That's when urban farming micro-leaf salads is going to come in. But for now, I would rather go into the wild and pick seasonal, foraged produce... I don't consider hydroponics awful, I just don't think they should be your first choice."

The Soil Association has also questioned the nutritional value of vegetables grown hydroponically: the lack of soil involved is the main focus of its concern.

Hofman concedes that a lot of what's grown hydroponically is grown in Spain, Israel or Holland, transported thousands of miles and pumped full of taste-diluting water to ensure that it is still the "right" size and shape when it finally reaches the supermarket shelves. For GrowUp, with its local supply model, the benefits are obvious.

Hofman also suggests that most food is grown "unnaturally", using fertilisers and/or polytunnels, whereas GrowUp's inputs are fish food and electricity, and both are sourced as sustainably as possible. "A GrowUp 50g punnet of pea shoots is sold by Farm Drop for £1.20," she says. "Our hope is that we can develop a business model whereby we grow micro herbs for restaurants, and that subsidises us to grow mixed salad for the supermarket round the corner."

Whether they can maintain that goal may depend on future investors. If a profit-oriented approach wins out, then surely it will be expensive micro-salad forever more, and renewable energy ditched for the cheapest provider? That argument misses an important point, says Hofman, namely that brand reputation is more vital than ever to food producers: diners and consumers increasingly want a feel-good, environmentally friendly story on their plate.

Hofman is already looking towards the next farm. "Our current projections are that at full capacity we should be operating this farm with a turnover of just over £500,000 a year. In six to eight months' time, once we demonstrate our operational excellence here, we will go out and seek investment to build a much bigger one... We're looking at a number of different options but we will absolutely remain urban. We want to create something that can be picked up and put into any warehouse near any city...

"I get such a kick walking through the farm every day and seeing what we're achieving," she adds proudly. "We're never going to have an impact standing on a street corner selling organic salad. We have to reach the mainstream. That's the goal here." FT