

New ideas are bubbling up

A new technology that injects microscopic gas bubbles into water lines to boost productivity, bird health and sanitation is creating a bit of a fizz in the poultry sector. **Gary Young** reports.

In the poultry sector it's well understood that small changes can have big impacts – but there are perhaps none smaller than the microscopic gas bubbles being credited with making big improvements to bird health and sanitation in poultry sheds across the UK.

Nanobubbles are a new technology whose moment seems to have come, with growing numbers of farmers embracing the benefits of infusing water with dissolved oxygen (see 'What are nanobubbles?').

One of the pioneering companies behind the growth in nanobubble technology is Shropshire-based O2 Agri, founded in 2021 by husband-and-wife team Caroline and Charlie Wellon, who have developed their own patent-pending nanobubble water treatment



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What are nanobubbles?

Nanobubbles are ultra-fine, microscopic gas bubbles that are infused into farm water systems. Because they are less than 200 nanometres in size (around 2,500 times smaller than a grain of salt), they can stay suspended in the water for long periods, increasing the dissolved oxygen content.

Charlie explained that O2 Agri's current system was capable of infusing around 500-800 million nanobubbles per millilitre of water, which dramatically transforms drinking water for the birds and aids natural sanitation on farm by disrupting and clearing biofilm without using as many chemicals.

Nanobubbles are good for poultry gut and overall health by improving respiratory efficiency, nutrient absorption and immune activity, reducing flock mortality rates. Trials have shown that nanobubbles can lead to better feed conversion ratios with higher liveweight gains, less intramuscular fat, greater feather growth and fewer physical defects, such as hock burn lesions.

The bubbles can also help to control pathogens. Charlie added: "We're increasing the concentrated oxygen, which is basically oxidization. Certain bacteria will then fail due to the high levels of oxygen, which is basically similar to how hydrogen peroxide or chlorine dioxide works. One of the things we're really quite passionate about is trying to reduce the amount of chemicals that the customer has to use."

equipment, supported by business adviser David Farley. All three are Harper Adams graduates, with Caroline and David moving into roles in agriculture and Charlie going into engineering before coming together to focus upon nanobubbles.

Since its commercial launch, the system has been introduced onto 10 broiler farms and one layer farm to date and has successfully hydrated more than 52 million birds.

Caroline explained: "We established the business on the premise that cleaning chicken sheds using horrible chemicals wasn't very nice and or very sustainable. We thought there had to be a better way. After a lot of research, we started using ozone to disinfect the inside of the sheds, but we couldn't just quite get to the levels of ozone we wanted.

"We found that nanobubble water and ozone was more effective and discovered that if you actually gave the chickens the nanobubble water plus the oxygen, the biofilm in the lines would be reduced. And on top of that, we saw huge health benefits from oxygen nanobubbles, so we trialled the system in 2022 and now have 11 units in poultry production in operation."

Charlie explained that by introducing nanobubbles, O2 Agri could increase the gas content of the water from around 6-10 parts per million (PPM) in standard water to around 50PPM, dependent on the type of water and its quality.

The amount of oxygen can vary depending on the



water source, with tap water containing higher levels than borehole water. The source can also affect the number of bacteria removed, although even with borehole water this can result in a 25-75% reduction.

"When it goes along the lines the internal pressure of the bubbles means that any biofilms in there collapse, so it acts like mechanical cleaning," said Charlie. "The nanobubbles carry along the lines, eliminating certain bacteria, and then the birds drink clean, highly oxygenated water. The hyperoxygenated water improves their feathering and results in a generally much healthier gut biome allowing them to convert their food more effectively – so it's a winner all round. It's been shown to be effective with both broilers and layers and has been

11 poultry units are using O2 Agri's system

introduced to turkeys as well."

Nanobubble technology is also being used in the pig sector, and has applications in other areas including, dairy, horticulture and agriculture, Charlie added, and the nanobubble technology can be adapted to fit the capacity needed by the farm.

"For the smaller egg layer sheds, it's on a little skid unit that can be literally rolled in," explained Charlie. "On the bigger broiler and layer sites – the four, six, eight-shed sites – we have an eight-foot container that goes as close as we can get to their main bulk water tank.

"The process is always being refined, but right from the start farmers have been amazed by the uplifts – we've seen a betterment of 0.03 on the feed conversion ratio (FCR) – and the birds just look so much healthier and produce a better litter. And although you'll never get away from using antibiotics completely our farmers have seen a big reduction in their use, which is absolutely brilliant."

Business Adviser David Farley is confident that there is a very clear business case to be made to every potential adopter of nanobubble technology.

"It's hard to quantify it objectively as no two farms are exactly the same and everybody's water supply is slightly different, but there's a really clear return on investment case," he said. "We're going to be trialling with a major player in the egg industry starting this year, so we're going to have some very solid data from that soon, which will be a really positive step."

O2 Agri are also winning wider industry recognition. Caroline is celebrating after winning a prestigious National Women in Agriculture award for innovation at a ceremony in London last month, and O2 Agri have previously been recognised as a finalists in both the National Egg and Poultry Awards and the British Farming Awards. ♥

CASE STUDY

Chris Wright, IEC Poultry

Poultry Technical Specialist Chris Wright oversees production at IEC Poultry in Shropshire and at a nearby rented farm and acts as a consultant for two other units, looking after just under 1.1 million birds.

He was introduced to nanobubbles through a presentation by an American professor in 2019 during a previous role and when he met with O2 Agri in 2021 he was sold on the concept immediately and keen to take nanobubbles out of the lab and onto the farm.

"We've been using nanobubble technology for nearly four years now

and I wouldn't be without it," he said. "It's self-contained so you don't need to touch it and from a staff welfare point of view, you're not messing with big tubs of acid.

"I was attracted by the green side of it and saw everything else as an added benefit. We definitely see improved KPIs, a better yield. We keep seeing on multiple farms a 0.03 FCR betterment cropping up, and we've seen certain parts of the bird – like the way it feathers, the way it puts weight on – definitely improved.

"The nanobubble system has delivered an outstanding return on

investment. Although we originally modelled a five-year payback based on replacing our existing chemical treatment programme, the combination of reduced operating costs and measurable performance improvements shortened the payback period to just over two years. The results have significantly exceeded our original business case.

"I just think it's a no-brainer just to have clean, nice water. It's safe for staff. The birds like it. There's been no detriment in the four years that we've run it. I just see it as being a fantastic alternative."