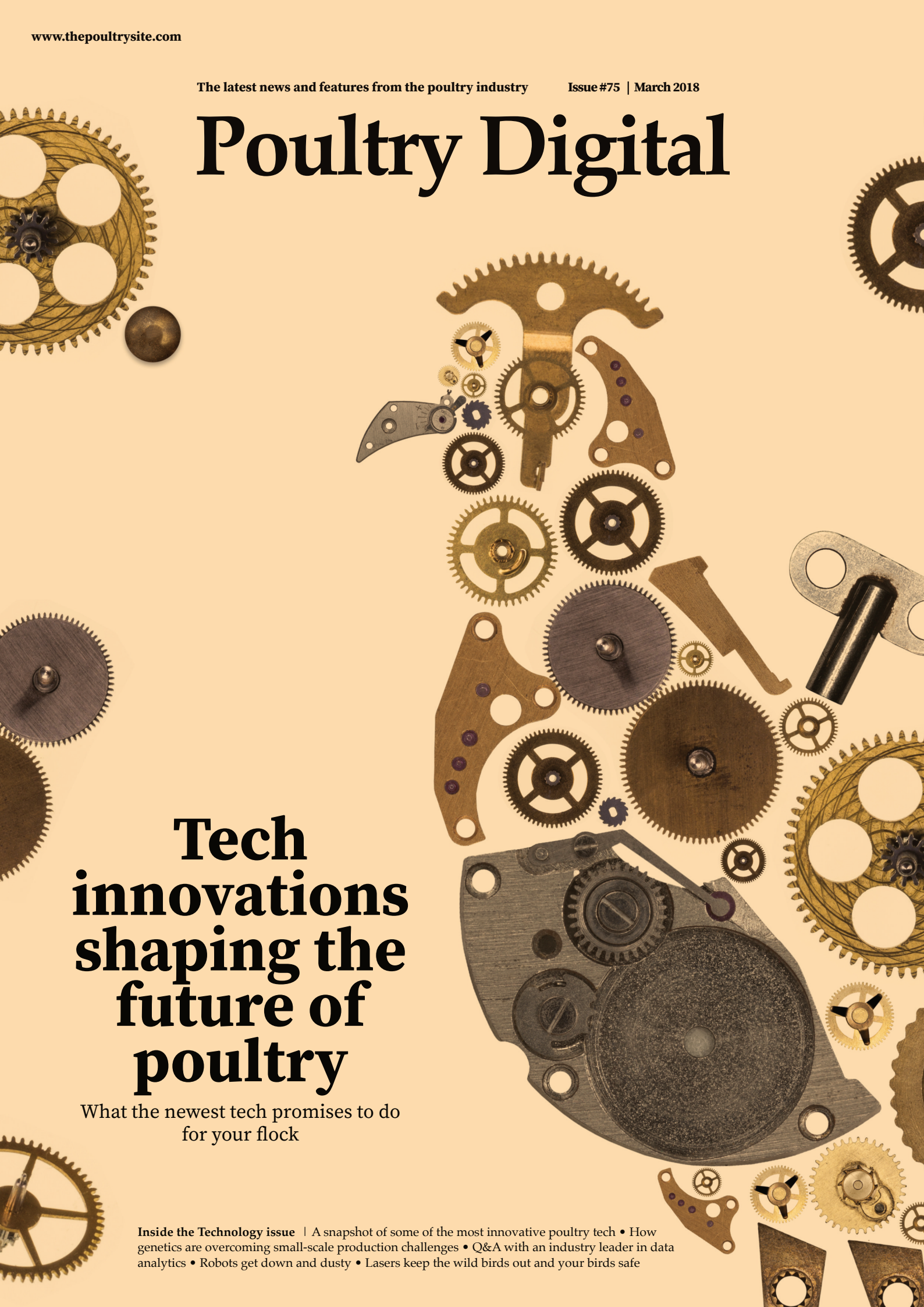


# Poultry Digital

## Tech innovations shaping the future of poultry

What the newest tech promises to do for your flock

**Inside the Technology issue** | A snapshot of some of the most innovative poultry tech • How genetics are overcoming small-scale production challenges • Q&A with an industry leader in data analytics • Robots get down and dusty • Lasers keep the wild birds out and your birds safe



# For professional people with a passion for poultry



The future is certain to bring both fresh challenges and new opportunities for those involved in poultry production across the globe. With this in mind, Boehringer Ingelheim is proud to offer you a range of comprehensive solutions to positively shape the future of poultry health.

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Shaping the future of poultry health





## FROM THE EDITOR

# “The age of digital farming is here”

Innovative technology promises to continue simplifying and automating many aspects of our everyday lives. Few sectors have avoided digitisation and from robots to lasers and chicken meat grown in a lab, new tech is quickly becoming a major part of poultry production as well.

This issue of Poultry Digital offers a snapshot of some of the newest technologies in development which promise to take on some of the biggest challenges in poultry. An Australian startup, MimicTec, is getting down to chick-level with their mother hen device which promotes happier, healthier chicks. Bright ideas from a Scottish company, Greengage Lighting, are helping to cut energy costs for growers while promoting welfare for their broilers (page 10). Industry leaders recognise that the age of digital farming is here with far-reaching implications for improvements to production and processing (page 16).

Read on to learn more and join us again in May for the latest sustainable poultry initiatives and developments!

Ryan Johnson | Editor



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### Looking ahead

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## Surge in alternative proteins as Nestlé and Tesco praised by investors for plant-based shift

GLOBAL 13 FEBRUARY 2018

As alternative proteins become mainstream, Nestlé and Tesco are named the best declared companies, while Costco has been called out for its inadequate response

The market for alternative proteins, such as ‘Impossible Burgers’, is set to expand by over 8% a year and reach \$5.2 billion by 2020. Now, a \$2.4 trillion investor coalition doubles support in 18 months, and calls on 16 food multinationals to plan for a shift to alternative proteins.

A new report entitled Plant-based profits, backed by a \$2.4 trillion coalition of 57 large investors, has urged global food companies to diversify their protein sourcing away from a reliance on animal proteins. An analysis of 16 multinationals concluded that Nestlé and Tesco were best positioned to benefit from a transition to alternative plant-based proteins. Other companies engaged included Kraft Heinz, General Mills and Unilever.

“Nestlé and Tesco were best positioned to benefit from a transition to alternative plant-based protein”

The investor coalition is coordinated by the FAIRR initiative, founded by private equity pioneer Jeremy Collier, and includes pension funds such as AP2, AP3 and AP4 and institutional investors such as Aegon, Aviva Investors, Collier Capital and Nordea.

Click [here](#) to read the full story.

## Smart and integrated: Quebec’s Couvoir Réal Côté looks to the future

CANADA 17 JANUARY 2018

Family-owned Couvoir Réal Côté, a well-known and long-standing business in the Canadian hatchery industry, is to expand operations to 400,000 broilers per week for the Quebec market, with a fully integrated new facility that will be built around a brand new SmartPro single-stage hatchery at its Ange-Gardien site.

With 12 SmartSetPro2 incubators, 12 SmartSetPro4 incubators and 14 SmartHatchPro hatchery, the new installation will also include a total overhaul of the hatchery’s climate control system, with air handling units that use 100% fresh air to eliminate the need for recirculated air and a completely new chilled water system. Hatchery automation will also

be replaced, with stackers, de-stackers and a new transfer, candling and clear egg removal unit as part of the project.

New washing machines, a vacuum system and a farm-to-setter trolley stacker/destacker are also included. The complete system will be connected by advanced, web-based SmartCenterPro hatchery management software, to deliver real-time analysis and reporting across the entire operation, both from Réal Côté’s office in Ange Gardien, or remotely from support teams at Pas Reform’s Zeddham HQ in The Netherlands or NatureForm in Jacksonville, Florida.

Click [here](#) to read the full story.

## India’s farmed chickens given some of the strongest antibiotics

INDIA 20 OCTOBER 2017



A report by Madlen Davies and Rahul M for the Bureau of Investigative Journalism reveals that chickens in India have been dosed with some of the strongest antibiotics in medicine. One of which, colistin, has been referred to as the “last hope” antibiotic because it is only used in circumstances where no other treatment is possible to fight infection. The World Health Organization has restricted its use in animals and banned it as a growth promoter.

The discovery was met with worldwide panic in the medical community as it meant the resistance could be passed to bugs which are already multi-drug resistant, leading to untreatable infections. Rampant use of the drug in livestock farming has been cited as the most likely way mcr-1 was spread. It has been detected in bacteria from animals and humans in more than 30 countries, spanning four continents. Another four colistin resistant genes (mcr-2 to mcr-5) have been discovered since. Colistin-resistant bacteria, once rare, are now widespread.

Professor Dame Sally Davies, England’s chief medical officer, also called for a worldwide ban on the use of not just colistin but all antibiotics as growth promoters. “If we have not banned growth promotion within five years we will have failed the global community”, she told the Bureau.

To read the full article by the Bureau of Investigative Journalism, [click here](#).

# Friesen Hatcheries, first hatchery in Belize to adopt single stage incubation

BELIZE 30 JANUARY 2018

**Friesen Hatcheries and Quality Poultry Products, a chicken processing business, coordinate in delivery of chicks to growers, while the chicken plant collects the broilers six weeks later and distributes frozen chicken all over the country**

In Spanish Lookout, a modern settlement in the Cayo District, we find Edward Dueck, general manager of Friesen Hatcheries:

“Our company, Friesen Hatcheries has been producing layer and breeder flocks in Belize since 1966. We have our own parent breeder broilers and brown layers. Our hatching eggs’ genetics come from internationally recognised companies in the USA such as Hubbard, Arbor Acres, Cobb and NOVOGEN.”

For its hatchery upgrade Friesen chose state of the art Petersime Single Stage BioStreamer HD setters and hatchers equipped with Operational Excellence Technology. Besides the innovative technology, Petersime’s commitment to

fast and high-quality customer service is what convinced Mr. Dueck to partner with Petersime:

“It was a large factor in our decision to know how other customers received technical support”

The project also includes Embryo-Response Incubation Technology, OvoScan. This system adjusts the temperature of the embryo environment by controlling the egg shell temperature. The OvoScan feature minimises embryonic mortality and optimises hatchability. Top quality day-old chicks also guarantee significant improvements in post-hatch performance (liveability, growth and Feed Conversion Ratio).

The hatchery will be equipped with



Petersime’s advanced hatchery information system Eagle Eye to monitor, control, analyse and report on every level of hatchery operations for each hatch cycle.

[Click here](#) to read the full story.

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## Tools of the trade

Aviagen's Global Technical Transfer Team provides online management tools to ensure optimum productivity and profitability for customers worldwide

For top results from your flocks, you need useful support tools – and the Global Technical Transfer Team (GTTT) at Aviagen® is at the forefront of helping customers achieve optimum productivity through a range of best-practice tools which form part of a wider customer support offering. [For a full article on this subject, see the Poultry Site.](#)

### Online tools at your fingertips

Online tools cover topics such as finding solutions to specific problems, generating productivity improvements and planning – and when you visit the [Resource Centre](#) you'll also come across items such as easy-to-use spreadsheets to help producers plan the correct house set-up requirements for their [breeder](#) or [broiler](#) operations.

### Uniplus – helping with flock management decisions

In addition to housing and equipment, Resource Centre tools include [Uniplus](#) – a unique Excel spreadsheet that helps broiler managers with flock management decisions by predicting broiler flock weight distribution for single-sex or mixed-sex birds from either sample weights or average weight (together with coefficient of variation); this is also a useful tool for predicting processing distribution weights.

"Our online tools are just one of many types of support materials that we produce," says Aviagen Global Technical Transfer Manager, Emma Longley. "Providing user-friendly information and advice, as well as addressing practical problem-solving, we see our online portfolio as an important addition to producers' discussions and dialogues with Aviagen's customer service personnel."

### A user-friendly, problem-solving tool

For a friendly and interactive question-and-answer-style problem-solving tool, [click here](#) and you'll find a handy Checklist for Investigating Broiler Performance Problems, fully downloadable and in pdf format for computers or mobile devices, and covering subjects as varied as: Feed; Chick Start, Feeders and Drinkers; Ventilation and Temperature; plus Lighting and Health. This interactive pdf provides information in the form of a checklist that farm managers can work through to identify broiler performance issues, as well as identify potential solutions to commonly seen concerns in a broiler flock. In a similar way, the [Aviagen Fertility Problem Solving Interactive pdf](#) offers a quick reference



guide to help identify the causes of infertility that may be experienced within a breeder flock, providing potential solutions and links to key literature.

### Responding to what customers want

"We're always in dialogue with our customers to find out what they want," says Nick French, Global Head of Technical Transfer, "so in addition to what's already up on our website, we're currently working on a series of online grading tools designed to help producers of Parent Stock. These tools will be available very soon, and will help farm managers through every step of the grading process." The online spreadsheet tool has been designed to assist farm managers with accurately grading their flocks, while the problem-solving interactive pdf provides detailed information on the grading process, pointing out potential pitfalls and solutions to commonly occurring issues during the grading process.

As for the future, the GTTT will continue to develop yet more and varied traditional and online tools, which are targeted at making customers' jobs easier, while also aimed at delivering even better results. "Our tools are simply an extension of Aviagen's commitment to personal customer support," says Nick French, "and if we can add to producers' bottom-line performance, productivity and profit, while ensuring optimal bird welfare and health, then we know we're adding value to their business!"

# IKEA announces Better Chicken Programme

GLOBAL 11 JANUARY 2018

IKEA Food Services wants to have a positive impact on people, animals and the planet. IKEA Food has developed the Better Programmes to address and focus ambitions for more sustainable agriculture for all major animals in the IKEA food supply chain.

Through the Better Chicken Programme IKEA Food aims to ensure broiler chickens are raised in accordance with criteria that promote better welfare such as adequate space (max 30 kg/m<sup>2</sup>), lighting, enrichment and breeds with improved health outcomes. They work towards responsible use of antibiotics and address key environmental impacts such as deforestation and pollution from manure.

The Better Chicken Programme criteria are to be implemented in two stages based on feasibility;

**“IKEA Food Services wants to have a positive impact on people, animals and the planet”**

certain criteria have a 2020 deadline, and final compliance with the Better Chicken Programme is expected by 2025.

The IKEA Food Better Programmes are global, developed with input from experts, NGOs and suppliers and set our minimum requirements for sourcing. The aim is to work towards sourcing of all species, chickens, laying hens, pigs, salmon, beef and dairy cattle, to be compliant by 2025.

[Click here](#) to read the full story.

# Saudi Arabia bans transport of live poultry

SAUDI ARABIA 4 JANUARY 2018

Health authorities in Saudi Arabia have banned the transfer of live birds inside the country, after a fresh outbreak of bird flu in the kingdom on Saturday, the official Saudi news agency SPA said. The transport ban was imposed on poultry farms, transport firms and bird breeders after seven cases of bird flu were reported in the last 24 hours throughout the Kingdom, SPA said.

According to Arabian Business, the Ministry of Environment, Water and Agriculture said poultry farms and transport firms would need to obtain the necessary licenses in order to transport poultry.

Five cases of bird flu were reported in Riyadh in recent days, one in the central Qassim region, and one on the Tarout Island in the Arabian Gulf.

The ban was expected to be lifted after the virus was contained within two weeks, Dr. Abdullah Kadman, a member of the board of directors at the Saudi Poultry Producers Association said.

[Click here](#) to read the full story.



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# Boehringer Ingelheim's 'Prevention Works' approach

Boehringer Ingelheim, a leading manufacturer of poultry vaccines, is committed to health and disease prevention through a holistic global approach to animal health. The company exhibited at the world's largest annual poultry, feed and meat technology exposition, the International Production and Processing Expo (IPPE), in Atlanta, Georgia, from 30 January to 1 February 2018, where all channels of the industries were represented.

The poultry industry is demonstrating substantial growth while being challenged with ever-changing consumer demands. Boehringer Ingelheim offers a portfolio of innovative poultry vaccines for coccidiosis, Marek's Disease, Newcastle Disease, Infectious Bursal Disease

and Avian Influenza. The company's range of innovative, world-class vaccines are complemented by a professional team with a passion for poultry. Boehringer Ingelheim believes that the value of an animal health company goes beyond the products. Industry knowledge, tailored offerings, state-of-the-art diagnostics and technical expertise all help improve the overall production and profitability of poultry producers.

"Ultimately, our goal is to shape the future of poultry health and help our customers take poultry production to the next level," stated Jerome Baudon, head of global strategic marketing – Poultry Business Unit at Boehringer Ingelheim.



About Boehringer Ingelheim Animal Health

As the second largest animal health business in the world, Boehringer Ingelheim is committed to improving animal health. With more than 10,000 employees worldwide, Boehringer Ingelheim Animal Health has products available in more than 150 markets and a global presence in 99 countries.

For more information about Boehringer Ingelheim Animal Health, [click here](#).

## Keeping Chickens

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# Six innovative companies shaping the poultry industry

## What the newest tech promises to do for your flock

Words Andrew Amelinckx

The poultry industry, like many other fields, is seeing its share of technological innovations due, in part, to small startups hyper-focused on a specific problem in need of improvement. Here are seven companies that are transforming everything from waste management to lighting and in so doing are helping to set the pace for the industry's future.

### Productivity

MimicTec, an Australian startup launched in 2016 by Eleanor Toulmin and Sarah Last, who are in their twenties, has created a device that mimics a mother hen to reduce stress and improve productivity in chicks. It provides heat and encourages chicks to bond with it. Initial testing has found improved feed conversion rates, weight gain and feed and water uptake, as well as reduced negative behaviors. "If they are not using all of that stress to develop stress hormones such as cortisol or corticosteroids, then the little baby chicks can use more of that energy to put on weight more quickly," Toulmin told the website The Victorian Connection. According to the company their product can save farmers money through reduced feed and maintenance costs and also provide better animal welfare.



**“MimicTec, an Australian startup launched in 2016 has created a device that mimics a mother hen to reduce stress and improve productivity in chicks”**





**7 BILLION CHICKS** | eggXYt works to put an end to male chick-culling

### Gene editing

Globally about 7 billion male chicks are culled shortly after birth in the egg-production industry each year. The males obviously can't produce eggs and aren't the right breed for the broiler industry (they're slower growing and don't produce a lot of meat) so they end up either being gassed, asphyxiated or, as is conventional in the US, ground alive. A number of companies have been working on the problem, including the Israeli startup eggXYt. The company is developing technology to identify male chicks in ovo before incubation, which means the male eggs can be rerouted to the food supply, egg producers don't have to pay employees to sex and cull male chicks and the males won't be needlessly killed. The technology first implants a genetic identifier into the mother hens that only shows up in male eggs. Scanners are then used to identify the males, allowing hatcheries to only focus on growing out females, according to the website TechCrunch.

**“egg producers don't have to pay employees to sex and cull male chicks and the males won't be needlessly killed”**

### Waste management

Limerick-based BHSL, recently named an Irish Times Innovation Award winner, has developed on-farm technology that converts chicken manure to energy that can be used to heat, cool and provide electricity for the farm. The company's patented system uses Fluidised Bed Combustion to convert untreated poultry manure into energy with the resulting ash





**CHICKEN POWER** | BHSL Hydro's Fluidised Bed Combustion System

## “Limerick-based BHSL, has developed on-farm technology that converts chicken manure to energy that can be used to heat, cool and provide electricity for the farm”

being used for fertiliser. The machines are compact enough to be used on site at farms and are remotely monitored by BHSL from their facilities. “The chicken farmer gets on growing chickens and doing what they do best and we are the energy provider managing that piece of technology delivering heat and other energy to the farm,” Jack O’Connor, the company’s founder and head of research and development, told *The Irish Times*.

### Clean meat

Clean meat, the name given to animal protein grown in labs rather than on farms, has seen a huge influx of capital

in the last few years. Memphis Meats, a California company that has created the first lab-grown chicken and duck in the world, has been one of the startups that has benefitted from big-time investments from billionaires like Bill Gates and Richard Branson and the agricultural giant Cargill. Tyson Foods, the US multinational company that’s the second largest chicken producer in the world, is the latest to invest in Memphis Meats. At its most basic, the process of creating meat in the lab involves taking a penny-sized biopsy of stem cells (the kind that can regenerate) from a live animal and feeding the cells various nutrients in an incubator. The cells are tricked

into thinking they’re still inside the animal and eventually create enough muscle cells to produce meat. No clean meat has actually gone to market yet, however. The main issue is scaling up production enough to bring costs down. Uma Valeti, co-founder and CEO of Memphis Meats, told me in an interview that when they do enter the market their meat will likely be at a “slight price



**PETRI DISHES AND DINNER PLATES** | Memphis Meats' lab-grown chicken



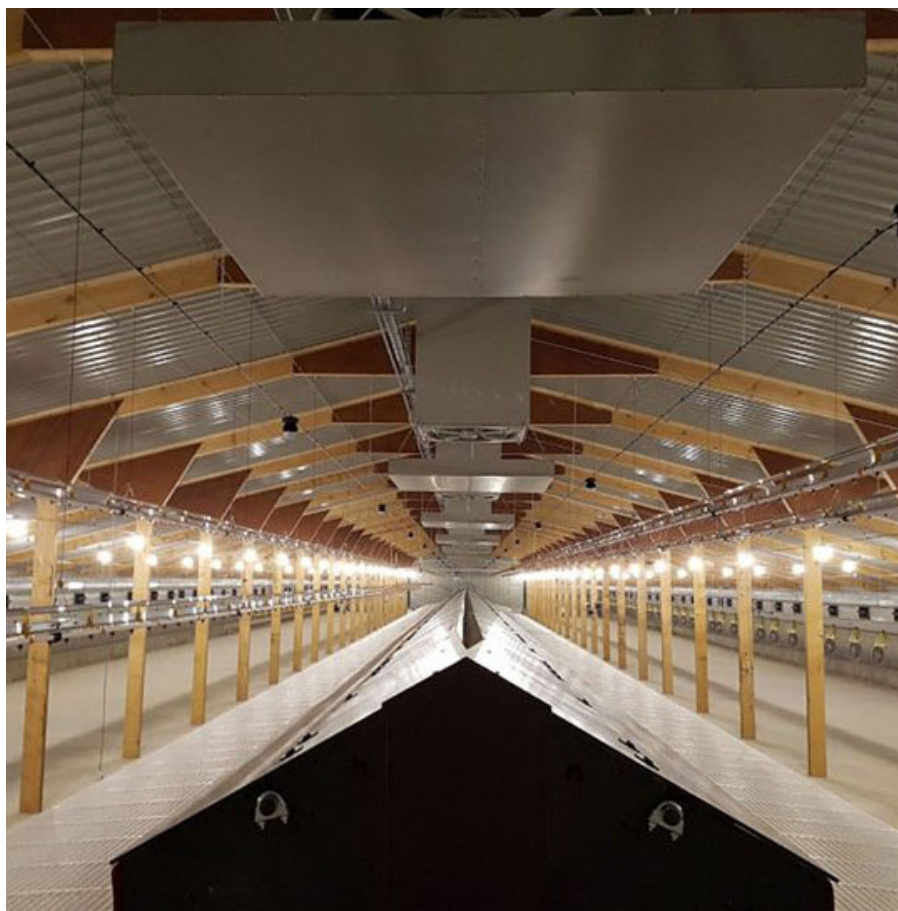
## “Memphis Meats, a California company that has created the first lab-grown chicken and duck in the world”

premium” but as they continue to scale up he’s confident the company will be able to produce meat at a price that is cost competitive with – and ultimately more affordable than – conventionally produced meat. The target date to get products on store shelves is 2021.

### Food safety

Launched in 2014 by Mahni Ghorashi and Sasan Amini, who have backgrounds in the genomics field, the Silicon Valley-based Clear Labs is bringing next generation DNA sequencing (NGS) to the food-safety industry. NGS refers to newer methods of DNA sequencing that are faster and cheaper than older processes. NGS provides a greater volume of data with fewer false positives and negatives, according to Ghorashi. The company primarily deals with safety and quality issues ranging from verifying whether an ingredient has been adulterated to preventing salmonella outbreaks, something the poultry industry has to contend with.

“We saw the opportunity to adapt those technologies for applications outside of human health. Food safety was something that intrigued us,” he tells me in a phone interview. “It’s a real-world problem – nearly 50 million Americans get sick each year from food-borne illnesses and thousands die. It’s a significant problem and a huge liability to food companies.” (The US Centers for Disease Control and Prevention peg the numbers at 48 million US citizens who are sickened and 3,000 who die per year.) In the UK, there are about 500,000 cases of food poisoning a year from known pathogens and twice that number when unknown pathogens are taken into account. Companies can store the information NGS provides in databases where “smart algorithms” can



**BRIGHT IDEA** | Greengage Lighting's LED lighting system

be used to mine the data for “predictive and preventive recommendations” that allow food companies to be proactive and preventative, and not just reactive, in regard to potential food-borne outbreaks, says Ghorashi.

### Lighting

The Scottish company Greengage Lighting Ltd has created the first ever LED lighting system that uses a patented inductive-power technology similar to that found in an electric toothbrush. This technology allows poultry farmers to easily clip on a range of LED lighting options anywhere along a cable system for customised lighting in poultry barns. Greengage’s Agricultural Lighting Induction System (ALIS) offers a variety of lights geared specifically for laying, breeding and broiler set-ups. “Independent scientific trials prove that our LED lighting provides optimum lighting conditions so that poultry grow consistently to a healthy weight while reducing welfare issues such as aggression, stress and foot sores, as well as stimulating

**“This technology allows poultry farmers to easily clip on a range of LED lighting options anywhere along a cable system for customised lighting in poultry barns”**

natural behaviour like perching,” Steven Mitchell, Greengage’s marketing manager tells me. The lights are resistant to the disinfectants typically used in the poultry industry, are shatter-proof and energy efficient. This year the company is releasing a line of sensors that monitor temperature, light, humidity, CO2 and ammonia, as well as thermal imaging and acoustic sensors that all can be clipped onto the same ALIS cables as the lights. **PD**

# Advanced genetics and genomics

**New innovation and technologies will result in vaccines becoming even more efficient and playing an even greater role in disease prevention**

Words Feed the Future Innovation Lab GIP Team

Local village chickens are an important resource benefiting food security and the livelihoods of impoverished people in less developed countries. Poultry eggs and meat provide high-quality protein and micro- and macronutrients, which are vital for preventing cognitive and growth delays in malnourished children. Chickens can also generate income for which women and children are the major beneficiaries, and therefore village birds meet essential household needs such as education and healthcare.

Village poultry production is a low-input system requiring little investment, thereby offering farmers security against financial risk. This is especially important given our rapidly changing world with growing human populations, changes in land-use, and increasingly unpredictable weather patterns. Local chickens also play an important socio-cultural role in traditional ceremonies and gift-giving.

Currently, the most substantial challenge for smallholder poultry producers is Newcastle disease (ND). Newcastle disease, which is caused by a highly contagious virus, threatens poultry populations worldwide and is endemic in many developing countries. Highly pathogenic strains of the virus can result in 100 percent mortality in affected flocks and have significant economic impacts as a result of trade restrictions. Vaccination is one of most effective approaches in prevent-



**SHARING KNOWLEDGE** | Smallholder farmers in Ghana share their indigenous chickens with the C

ing ND outbreaks. However, it is very difficult to implement sustainable ND vaccination programmes in Africa, especially in rural areas with inadequate agricultural extension services, limitations to maintaining a “cold chain” – refrigeration at all stages of the transportation process – to keep the vaccine viable and unreliable production and distribution.

Biosecurity measures are also extremely important in disease prevention and control, but are challenging to put in place in these systems, in which chickens from multiple households are free-ranging and comingling with other chickens and wild birds. In addition to ND, heat stress limits poultry production in less developed countries. Elevated temperatures and heat waves stress chickens, resulting in lower feed intake, reduced productivity and mortality. Feed additives can reduce the impact of heat. However, these products are not readily accessible in rural areas.

Genetic selection for enhanced resistance to ND and heat stress offers a promising complementary approach to addressing these constraints. Chickens each have about 1 billion DNA base pairs that control their genetics. With recent technical advances, the chicken’s genetic code can be studied in detail. Genetic variation among chickens accounts for differences in disease resistance and heat tolerance, thereby allowing for





GIP research team

genetic improvement of targeted traits. For example, genetic improvement has been successfully applied to enhance resistance to Marek's disease in chickens. Selected lines demonstrated significantly higher survival compared to standard lines under Marek's disease virus challenges. Disease resistance and heat tolerance are both complex traits meaning that hundreds or even thousands of differences in the genetic code contribute to genetic improvement, each having a very small effect.

**The Feed the Future Innovation Lab for Genomics to Improve Poultry** (GIP), which is led by UC Davis in collaboration with Iowa State University, Sokoine University of Agriculture in Tanzania (SUA), the University of Ghana (UoG) and the University of Delaware, is applying cutting-edge genomics technology to identify natural genetic variations associated with ND resistance and heat tolerance in diverse indigenous African ecotypes and in well-characterised chicken experimental genetic populations.

The Innovation Lab has established poultry models for evaluating resistance to heat stress and Newcastle disease virus (NDV). Using these models, the Innovation Lab has identified several genes, biomarkers, and genetic pathways associated with heat resilience and NDV resistance. Our results show

## “The Innovation Lab has established poultry models for evaluating resistance to heat stress and Newcastle disease virus”

that viral load (quantity of virus in tears), and antibody level against NDV could be important indicators of the chicken's resistance to NDV. Heritability of these traits in African indigenous chickens is moderately high, suggesting that using these traits in a selective breeding programme to improve the chickens' resistance to NDV and heat stress is feasible and promising. The Innovation Lab is currently developing an economic diagnostic tool with genetic markers and associated biomarkers to use in the subsequent breeding programme to enhance NDV and heat resistance.

In addition to improving US lines, this genetic diagnostic platform will be applied to low-input production systems in Africa, where disease resistance in indigenous chickens is particularly important. Genomics to Improve Poultry investigators are engaging with smallholder farmers and other stakeholders from the public and private sectors in Tanzania and Ghana who are interested in African indigenous poultry production to better understand the vital actors in the poultry value chain. This information will inform the most effective means for sustainable breeding and distribution programmes for the genetically improved lines.

Capacity enhancement has been a key component of the GIP programme. Renovations of poultry breeding and animal-trial facilities at SUA and the UoG have provided critical infrastructure for further poultry research investigations. Training of staff, faculty and students at these institutions on biosecurity, poultry handling, sample collection, molecular laboratory procedures and advanced genetic tools and data analysis is building the local workforce needed to sustainably improve poultry production systems in Africa. Contemporary genomics, coupled with education, training and outreach, will enable innovation and the development of the enhanced technology needed to achieve maximum productivity for smallholder poultry farmers in Africa. **PD**

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# Farming in focus

## Meet the people driving change in their industry

Words Ryan Johnson

**Caroline Forest**  
Chief of sales and marketing officer, Intelia

Caroline Forest is chief sales and marketing officer for Intelia, a company that is revolutionising poultry production with its Compass Data Analytics platform. With more than 15 years of experience in the precision farming industry, Caroline has seen production methods evolve at a rapid pace. She believes that the use of automation and ever more powerful algorithms is now essential for farmers who want to monitor and improve the quality, safety and productivity of their production in real time.

### How do you foresee the development of poultry tech over the next 5-10 years?

The next decade will be marked by the colonisation of technology in poultry houses. When we look at the evolution of the poultry industry over the last 40 years, we realise that optimisation has come through genetic, nutritional, veterinarian and processing improvements. It is now extremely difficult to increase profitability in these areas. However, there is still a place where optimisation has just started: the farm.

I think that the capture, analysis and interpretation of the data produced by livestock production activities is the next step in profitability optimisation for the livestock industry. The use of IoT (internet of things) devices to collect data at the farm will increase exponentially. But as Aidan Connolly from Alltech said recently: the data is only as good as what you do with it. It needs to be actionable. And to be able to act on data,

**“The next decade will be marked by the colonisation of technology in poultry houses”**



you need to analyse it. That's where there is a gap in the market right now. Farmers don't necessarily need more data; they need a clearer picture. We provide that picture for them.

### In what ways can small-scale poultry producers benefit from technological innovations which primarily benefit large-scale producers?

The economies of scale will be bigger for large-scale producers but if a data-management system is able to detect slight deviations in performance or health issues before they turn into full-blown problems, the benefit is the same regardless of the scale of the farm. The challenge of lack of qualified farmhands is even more critical for the small-scale farmer. Whatever pain the large-scale operation has, it puts even more pressure on the smaller operations because their resources are scarcer. With a system like ours, both operations can use our solution to prioritise their actions, to focus on the issue that is most urgent instead of doing it based on a routine. In this sense, Intelia's production data analytics solutions are as relevant to large farms as small farms. They allow the grower to monitor their production remotely in real time and eventually to automate certain tasks. This is a major asset for every small producer who often must wear many hats on his farm, and who's often overwhelmed by all the tasks he must do. It allows him to get



out of some daily operational tasks and focus on the strategic direction of his company.

### **What are the top three forces driving technological innovation in poultry today?**

There is no doubt in my mind that artificial intelligence is going to be the force that will drive the poultry technological evolution. The development of reliable and pertinent artificial intelligence tools, sensors and the so-called internet of things will also be important forces.

Production sensors have been sitting in poultry houses for years. Since they've been installed in the buildings, it allows the grower to adjust and control parameters in the barn. What we realised is that the grower has been sitting on an unused goldmine all this time. While helping to control ammonia and humidity levels in the production building, these sensors produce tons of relevant information on the state of the flock.

By connecting these objects (with the internet of things) and processing them through sophisticated artificial intelligence solutions (algorithms), it is possible to obtain relevant and actionable insight that can help grow healthier birds at a better price.

### **We know how technology can improve the economics of poultry, but how can it promote environmental sustainability in poultry production?**

With our Compass Data Analytics platform, improving the profitability of the industry goes hand in hand with environmental sustainability. By allowing producers to monitor their chicken-house performance in real time, it is easier for them to optimise their production resources.

Maintaining a good balance between expenses to heat or ventilate while ensuring the health of chickens is a way to produce healthier birds using less resources. When the yield of a farm is improved, and the farmer has been able to do that for less money, or even at the same cost, the environmental footprint is decreased.

Another example is through feed management. By being able to view actual feed stocks on farms and predicting when silos will be empty, it is easier to coordinate delivery routes to maximise the cost of sending that truck out there and to avoid unnecessary deliveries. These are some examples but there are many more.

## **“Maintaining a good balance between expenses to heat or ventilate while ensuring the health of chickens is a way to produce healthier birds using less resources”**

### **What aspect of poultry production would you say is in the greatest need of advancement?**

In the US, because of market integration, the production operations that are happening at the farm are the ones that are least visible to the integrator. Still, this is where around 60 percent of their production is happening. They may send production supervisors to visit farms once a week, but this system is flawed in two ways.

First, it does not allow them to prioritise the interventions of these supervisors. They visit the farms based on a routine, unless a farmer was quick enough to alert them to a potential performance deviation. So the chances of them going to several farms that are doing well before finally reaching the one that is struggling are high.

Second, once they get to the farm, unless something is happening right then and there, they will rely on historical or partial information to assess whether the production is on track or not: last week's mortality and ammonia rates, today's weight, the current health status.

Nowadays, it is common for field supervisors to have 20 farms, if not more, under their supervision. They cannot devote as much time as they would like to support contract growers and help them improve. If we can help them have access to information in real time, they can make better-educated decisions about their time, making them more efficient.

Even in non-integrated markets, the evolution in technology and the pressure to monitor an ever-growing number of indicators is making it difficult for farmers to stay on top of it all. Twenty years ago, one had to ensure the temperature was right, that feed was in the pans, that water was readily available and that the birds were growing. Now, consumer demands for antibiotic-free meat, animal welfare and more are adding complexity to the job of raising birds. Given time, I'm sure a majority of farmers would be able to cross-analyse the data and make corrective measures for the next flock. But they don't have that time, and even if they did they'd be relying on historical

data. That certainly has its place in the toolbox of farmers, but it does little to help you prevent problematic events. When your margin to investigate potential performance issues decreases, the window of time for you to correct closes proportionally. So the key is to detect early so you can correct quickly. Our system helps them do that.

### **What about for processing?**

Intelia is focused on live production at the farm. So our knowledge of the improvements that can be done with processing is limited to that period between harvest and the actual killing. There is a great deal of logistics involved in getting that timing just right. We have discussed this at length with both Canadian and American processors and they tell us their main challenge is to get the right bird weight at the plant. With little visibility into what's going on at the farm, they rely on manual weighing of a few birds seven days prior to catching to guess what the weight will be when the birds get to the plant. By their own account, that prediction is about as accurate as flipping a coin. It makes for a very difficult planning process because you don't know what to expect and which lines should be used, and the result is that expensive slaughtering machinery may not be used optimally. Plants are very good at adapting to these changes and processing teams are capable of maintaining great efficiency. Just imagine how much more they could do if they could count on more accurate information.

For example, our system allows processors to see a dynamic prediction of bird weight over 14 days. This means this prediction will continuously evolve to reflect current events. A lot can happen in the last days of a flock, and because the birds gain so much weight daily towards the end, it is very easy to deviate from expected performance, if there is a feed outage for instance.

So much improvement has been brought to processing through automation, I believe there are still some savings that can be obtained through the introduction of some automation into the harvesting and killing schedules. **PD**

# Robots – the new frontier in poultry production

**While uptake is slow, robotics promises to improve poultry production efficiencies and ultimately boost food security**

Words Glennis Kriel

They might not be in line with our movie-informed ideas of what a robot should be like – such as Data in *Star Trek* or R2-D2 in *Star Wars* – but robots are playing an increasingly important role on poultry farms. By improving production efficiencies, they are boosting food security, improving animal health and welfare as well as contributing to better labour conditions and farm profits.

The French company Octopus Robots, last year launched two entirely autonomous robots. These bots very much resemble Hollywood's animated rubbish-collecting bot Wall-E, as their primary functions, depending on the model, are either to clean and disinfect poultry houses or turn and aerate poultry bedding. But the bots are also modular – perhaps making them more like a Transformer – allowing users to turn them into several versions with the ability to perform different tasks.

Besides their primary functions, the robots are equipped to collect, analyse and store data – with sensors, cameras and other systems – through which they may help to improve record keeping and traceability on farms. The bots continuously measure environmental factors, such as temperatures, humidity, carbon dioxide and ammonia levels, alerting farmers in real-time of deviances and potential problems.

Frédéric Pradelle, chief marketing officer at Octopus Robots, says that robots are boosting biosecurity by performing tasks much more efficiently than would have been possible with manual interventions.

“Repeated avian flu outbreaks, the increase in zoonotic disease, the development of multi-drug-resistant organisms and the risk of bioterrorist attacks,” he says, “are harsh reminders of the crucial need to act quickly and effectively during a disease outbreak. By reducing human contact with birds, removing human error







and doing tasks more efficiently, robots, such as ours, are becoming an invaluable tool in this on-going battle.”

Pradelle identified navigation as the biggest challenge in developing this type of technology: “You cannot use global positioning systems indoors, so we have had to develop a navigation system that combines the use of shape detection and recognition, triangulation and anti-collision systems, to mention only a few. Our technology is inspired by autonomous-vehicle technology.”

Other developments

Another company that has created a robot that will greatly improve efficiencies on poultry farms is Metabolic Robots. Their robot is similar to the fictional Hal 9000 from 2001: A Space Odyssey, in the sense that it is a smart computer that manages, measures, monitors and controls functions. Unlike Hal 9000, however, the robot can be switched off by the push of a button.

So how does the robot work? Ziv Dubinsky, CEO of Metabolic Robots, explains that the computer improves feed efficiency and, in effect, flock uniformity by taking over feed-line motors and adjusting the location and frequency of feedings: “The computer is installed on existing infrastructure,” he says. “It controls the feed motors via algorithms and uses sound and light effects to draw birds to empty feeders and drinkers.”

The technology is primarily aimed at the broiler market, as feed efficiency is higher in the layer industry and with mother flocks where timers are used to feed the birds two to three times a day. Dubinsky estimates that the feeding robot could reduce feeding costs by at least 5 percent, thanks to improved feed efficiency: “Total savings will be higher, as animals are

**“Dubinsky estimates that the feeding robot could reduce feeding costs by at least 5 percent, thanks to improved feed efficiency”**



**OCTOPUS ROBOTS** | Able to turn and aerate poultry bedding, with the minimum disturbance to birds

generally more healthy, having access to feed when they want and need it.”

The system’s prototype was able to alert farmers of any trauma or pathogens that affect trackable feeding patterns in the flock and this feature has now been improved to suggest the type of infection, pathogen or trauma when the computer is connected to a broiler weight platform and a water-flow sensor.

“Farmers often recognise a health threat too late,” says Dubinsky, “so we have equipped our robot to not only give early warning of such threats but also to identify the specific threat or infection so farmers would know what remedy to use. At the moment, we are also working at combining an environment controller into the system to create a full barn robotic farmer, as well as a food-safety animal-welfare monitor.”

Various other robots have also become commercially available, ranging from bots that use artificial intelligence to debone a chicken in two to three seconds – almost like the Terminator





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might – and nanny bots that detect ill birds in flocks by monitoring temperatures and bird movements.

**The future**

The application of robotics in the poultry industry is nevertheless still in its early stages. “Like the automotive industry did over the past 20 years, the agriculture industry is currently achieving its own revolution by entering a new era of AgTech and Agbots,” says Pradelle.

Octopus Robots was launched in France and Italy last year, and plans to launch in the UK, Germany, the Netherlands, Latvia, Romania, Bulgaria, Poland and Russia within the next couple of months, and in the Middle East and Asia before the end of the year. The company is also seeking distributors in South Africa.

Plans are to branch out to the United States in 2019 to 2020: “We have to make the robots compliant with local regulations and are in the process of developing an advanced marketing plan for the States, through which we will cooperate closely with business partners and more

**“While the Metabolic Robot is not yet used commercially, it has received international recognition for its ability to improve poultry-farm efficiency”**

specifically partners located in the major poultry producing states,” says Pradelle.

Market penetration is relatively slow, primarily because it takes time to develop, test and ensure the technology conforms to various standards set out by different countries, according to Dubinsky.

“Metabolic Robots was patented in 2009 and a prototype was developed in 2012. There are two operational beta versions running on two farms in Israel and long beta tests and data mining have been done in 12 locations across the world, including Ecuador, Estonia, Germany and Israel, with clients using internet-of-things blockchain technology to transmit data out of jungles and various other locations with no internet access,” he says.

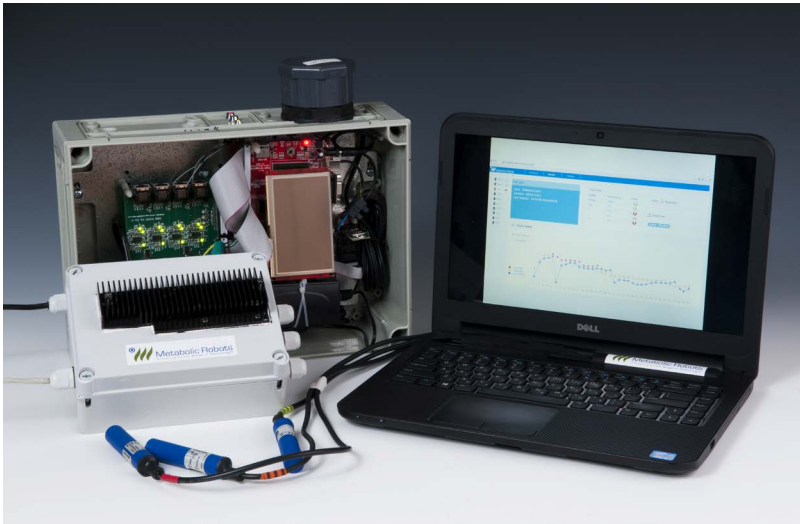
While the Metabolic Robot is not yet used commercially, it has received international recognition for its ability to improve poultry-farm efficiency. According to findings presented at last year’s Poultry Science Conference held in Tel Aviv, birds in the beta tests performed much better than birds in control groups, with the feed conversion ratio being reduced by at least 4 percent in all locations.

The company has been awarded the EU’s Horizon 2020 programme’s “seal of excellence” and was a finalist in the global Nutreco Feed Tech Challenge. Dubinsky has also won Israel’s most prestigious award for technology – the Prime Minister’s Prize for Innovation – in 2014 because of his work’s social impact.



**METABOLIC ROBOTS** | Metabolic robots may be switched off by the mere push of a button





**METABOLIC ROBOTS** | Metabolic robots control feed line motors via algorithms and adjusting the location and frequency of feedings through light and sound manipulation

The company is currently taking orders from new clients and looking for partners, with a serial version planned to be launched by the end of 2018. It is also involved in two other projects: performing trials in the Netherlands with a novel non-invasive technology to determine the sex of unhatched eggs and the planning and construction of a next-generation insect-growing system.

Market penetration is slow because of a lack of incentives and regulations to promote automation in the industry, as well

as the length of time it can take commercial farmers to acclimatise to new technology. "A pull is needed to get producers to adopt the technology faster; this will most probably come from insurance companies who see the potential of robotics in reducing farm risks," says Dubinsky.

Pradelle identifies fear of change, and fear of robots in particular, as another obstacle. Dubinsky, however, feels that fear of the technology should not be a problem as most companies in the agricultural industry aim to make high-tech innovations as friendly as possible, so the systems are usually self-maintaining, relatively robust, plug-and-play, one-touch solutions. "Metabolic Robots will not break down," says Dubinsky. "If any malfunction occurs, the barn will simply switch to non-robotic feeding like before installation."

Pricing is not really an issue either, according to Dubinsky. He explains that the Metabolic Robot costs roughly US\$3,000 per barn, but it has the ability to conservatively reduce production costs by \$16,200 per broiler-house cycle. To justify the investment, the barn should ideally have three feed lines or more, with 20,000 to 60,000 birds per batch.

Both Pradelle and Dubinsky feel their robots do not threaten on-farm labour, but actually translate into better work conditions for their human co-workers, and will allow farmers and their staff to focus on more important matters. **PD**

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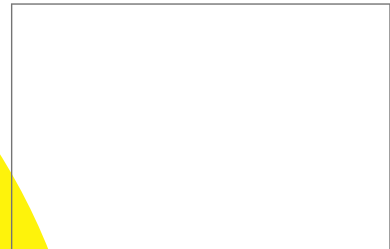
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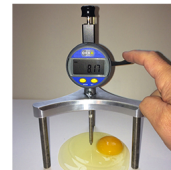


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# A laser-like focus on disease prevention

**Chris McCullough follows up with a producer who used the latest laser technology to protect his flock from avian influenza. Did it work?**

Words Chris McCullough





**W**ith more confirmed cases of bird flu emerging across the UK and Ireland, poultry farmers are once again being asked to remain vigilant and take all necessary steps to ensure their flocks remain clear of the virus. The most recent cases include 20 swans belonging to the Queen's Windsor flock that are thought to have died as a result of bird flu. A white-tailed sea eagle was also found dead at the end of January in County Tipperary confirmed with avian influenza subtype H5N6.

With these latest cases, departmental officials across the UK and Ireland have urged farmers to be on the lookout for signs of the virus. On top of taking all the necessary biosecurity measures, farmers are also looking at extra ways of protecting their flocks, including the use of lasers to try and keep wild birds at bay.

Last year, an outdoor organic poultry unit in East Sussex

leased laser technology developed by a Dutch company to scare off other birds from mixing among their laying hens. The system made a huge difference at Orchard Eggs, run by Dutch husband-and-wife team, Daniel and Karen Hoerberichts, who keep 4,500 hens outdoors on their farm near East Grinstead. They leased the lasers at a cost of £500 per month for a three-month period from UK distributors PestFix (UK) and noticed a significant difference.

The farm is not currently using the lasers but with all the recent confirmed cases of bird flu in the UK and Ireland, Daniel is seriously considering using them again soon.

"The lasers are expensive at £500 per month but they did work for us," he says. "If they prevent birds from landing among our hens then they are surely worth it. Selling the eggs from our hens is our livelihood and if there was a case of bird flu within the flock then that's the end of our income."

**“Daniel was the first poultry farmer in the UK to set up the laser system in a bid to keep other birds away”**







Daniel was the first poultry farmer in the UK to set up the laser system in a bid to keep other birds away. His farm in East Sussex is not on any wild bird migratory route but he was having problems with pigeons, magpies and other local species, any of which could also carry the bird flu virus.

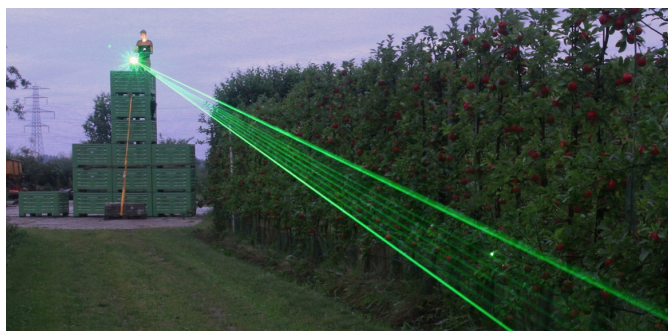
"We leased the system for three months after careful consideration," says Daniel. "It took a few days for us to notice any results but after that we really did witness a lot less birds around."

"Crows, jackdaws and pigeons were a problem for us and were regularly landing in our grounds. However, the lasers did keep them at bay all except for the magpies which seemed to get used to the laser beams."

At Orchard Eggs the hens roam freely around 50 acres of orchards and have access to moveable houses within the grounds when they need it. Neighbours of Daniel's also witnessed a reduction of birds landing, particularly one who is a keen gardener.

"We saw a 90 percent reduction in the other birds landing on our site," says Daniel. "The lasers, although not a guaranteed insurance against bird flu, gave us the feeling of security and peace of mind that we were being proactive in defending our flock."

"Close to our farm is a neighbour who grows a lot of fruit and vegetables. He also noticed a big difference when the lasers were installed. Sadly, he also noticed a huge difference when the lasers were taken away again as the birds returned and destroyed some of his crops."



TARGET DEFLECTED | Bird Control Group's laser in action

"We are watching the current developments regarding bird flu cases very closely," adds Daniel. "If the situation of outbreaks becomes worse we will consider setting up the lasers again."

"Last year we were receiving calls from Asia, America and Africa asking us how effective the system was. It's certainly not cheap but was effective in our situation."

According to the technology's developers, the principle of repelling birds with a laser beam was inspired by nature. The birds think the approaching laser beam is a physical object; they go into survival mode and fly away.

The automated laser is an innovative method of repelling unwanted wild birds without causing harm to them, the chickens and the surrounding environment. The system has been developed by the Dutch company Bird Control Group, in cooperation with the Delft University of Technology in the Netherlands.

The laser is silent and shows effectiveness of 90 to 100 percent in bird dispersal at farms, which the company says makes it a viable alternative to the expensive method of installing nets all around the entire poultry farm.

Steinar Henskes, CEO of Bird Control Group, is pleased his company's automated technology is helping poultry farmers defend their business across the world.

He says: "I believe we can help companies in the poultry sector to prevent conflicts with birds. We noticed the entire

## "Close to our farm is a neighbour who grows a lot of fruit and vegetables. He noticed a big difference when the lasers were installed"

value chain has problems with birds – from the large poultry farms who want to keep wild birds away to prevent avian flu to the processing sites and packaging companies which face health-and-safety issues caused by wild birds.

"In 2016 and 2017 we completed early trials and first installations at poultry farms. We are pleased that the automated laser technology has been adopted by first movers in both the United States and Europe."

"We admire the innovative ways poultry farms defend their business from the risk of avian flu and we are happy to be part of the final line of defence."

Dan England, director of distributors PestFix (UK) says: "We are also continuing to monitor the bird flu outbreaks and where they are being detected. Our company maintains communications with farmers in how the lasers can help keep unwanted birds at bay by sending out information on our products via mailshots and online."

He adds: "There are a few new developments within the lasers such as longer ranges and brighter beams that will help poultry farmers protect their flocks even more." **PD**



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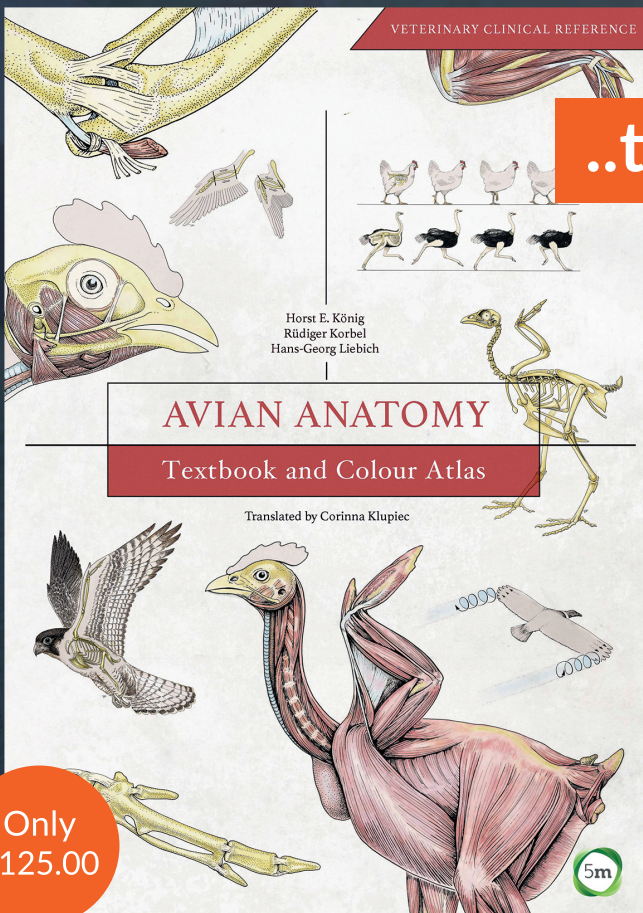


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# Introducing...

## The White Chantecler

Words Ryan Johnson

While perhaps not a well-known breed by many and certainly not part of the mainstream (The Livestock Conservancy has it on its 'Watched' list), the Canadian White Chantecler was innovative for its time. Originating in the small community of Oka, Quebec in Canada, the breed gets its name from the French chanter, (Latin cantare) 'to sing' and clair, (Latin clarus) 'bright'. In 1907, Brother Wilfred Chatelain took notice of the fact that Canada had not yet established a breed of its own. He thus oversaw the creation of the Chantecler, working with the monks of the Cistercian Abbey in Oka to produce a breed which was uniquely suited to the wintry challenges of the Great White North.

Bred for purpose, this hardy breed is productive both as a layer and for meat production – even throughout the cold Canadian winter. In fact, the Chantecler was developed to thrive particularly in these conditions, with tight, fluffy plumage for good insulation and a very small cushion comb and wattles to prevent frostbite. The White Chantecler was entered into the American Poultry Association's Standard of Perfection in 1921, followed by the Partridge variety in 1935.

Larry Christian has a few Chanteclers of his own, and lives in one of the coldest parts of Canada, says they are "the only ones who don't get frozen combs or wattles in winter. They seem to keep warmer and aren't troubled by the cold." He goes on to say that beyond just staying warm, "they stay alert and friendly all winter long."

The Chantecler is a productive, multi-purpose bird and can be described as hardy, tolerant and quiet. While not one you hear about often in discussions about the advanced breeds of today grown in technologically forward farms, the Chantecler is a grounding reminder of a time when innovation was achieved at a humbler pace. **PD**



**“Bred for purpose, this hardy breed is productive both as a layer and for meat production”**





# YOUR QUESTIONS

Poultry professional Mike Colley answers the best questions from The Poultry Site community



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## Q: What technological advances do you foresee will significantly advance poultry production within the next five to ten years?

**A:** Technology is driven by market forces, facilitated by investment and the right people being in the right place at the right time. Globally, the driving force for innovation is economics, which vary from country to country. In the UK, resource consumption linked with production timescales are key to lowering costs and there is progress being made in increased growth rates and digestive efficacy which reduces feed consumed and time housed. It won't be too long before we see feed conversions of 1:1 and slaughter ages below 28 days, which currently sit at 1:1.6 and 35 days respectively.

What will check these developments will be public pressure regarding welfare – which is moving from subjective ideas of what a chicken likes to an empirical understanding of what chickens need – and threats of disease, either perceived or actual.

Expect dramatic developments in nutrition and the manipulation of gut flora, and novel changes to the skeletal system enabling birds to carry extra meat. For laying birds, single-sex progeny to eliminate the wastage of male chicks is top priority, both for the breeders and the welfareists. Prolonging the productivity of laying birds may be coupled with increased ovulation. Currently it takes around 26 hours for an egg to be formed within the hen; if this could be reduced

below 24 hours, or if more than one egg could be formed at the same time, these would be massive leaps forward.

### Q: I'm new to backyard poultry. Is there anything I ought to avoid feeding my chickens?

**A:** Welcome to the industry. I hope you have many years of pleasure from your flock. When it comes to feeding chickens, many people think of kitchen scraps. The days of feeding scraps and leftovers are over. The risk of infecting your flock with *salmonella* and other food-borne disease is too great – so much that it's been made illegal within the EU.

That said, if a chicken will eat them, scraps are unlikely to do it any harm. Chickens are omnivorous and not particularly fussy; modern poultry diets are designed for birds in commercial production systems and these birds are like athletes so need plenty of calories, protein and micro-nutrients (vitamins and minerals). If you have got some hybrid pullets they will also benefit from these diets.

The thing to be careful of is, which is fairly rare, since chickens tend to eat what they need, but if you have some of the really heavy breeds, you may need to keep an eye on weights so they don't get fat. Generally you need to avoid fatty or sugary treats; don't give them

scraps; and if you want to dig worms up, which is great fun (for the chickens), keep up an intestinal worming regime, as earthworms are one of the main vectors of ground-borne disease. Don't feed anything rotten, mouldy or strong in flavour or smell, the former may lead to poisoning and the latter may lead to tainting of eggs.

### Q: How can I keep my chickens happy and healthy if it gets too cold, or too hot?

**A:** Although the ancestors of chickens lived in the warm forests of India and South East Asia, they've been domesticated for so long and in such variety of climates, they can cope with a wide range of temperatures.

But let's start with heat: it'll never get too hot for chickens in some countries. Heat does not kill chickens, but they will die in hot weather from lack of fresh air, overcrowding, lack of water and direct sunlight.

Overcrowding and lack of air should not be an issue for the backyard keeper, but if your birds are kept indoors, perhaps because of local bird flu, ensure a door is open with a wire screen to prevent escape, even leaving it open at night to allow plenty of fresh air in. Depending on your flock size consider using an enclosed electric fan to assist ventilation. Look for birds holding their wings out and panting excessively; sniff the air for ammonia, which will sting your eyes and nostrils. As long as the air in your hen house or run is fresh there should not be a problem.

For the open air, provide shade in the form of trees, bushes or a sheet draped over the run or fence – anything that casts a shadow. Chickens are very cold tolerant but will not appreciate damp, draughty conditions.

### Mike Colley

*Mike has had an interest in all things chicken since he first asked his mum on the school bus "what colour eggs do different coloured chickens lay?" aged five. Over the next 45 years Mike developed his knowledge of poultry: in his backyard, breeding, hatching, showing and selling chickens, as well as in the commercial poultry industry as an Area Manager and, latterly, a Research Manager.*





# EVENTS

Poultry events from around the globe

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## The Poultry Federation Food Safety Conference

Date: 6-7 March

Location: Branson, Missouri, USA

Nearly 300 food safety professionals, industry representatives and members of the academic community from across the country attended the growing conference last year. Participants received critical information on the topic of food safety from some of the best and most knowledgeable speakers in the business.

[www.thepoultryfederation.com/events/14-food-safety-conference](http://www.thepoultryfederation.com/events/14-food-safety-conference)

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## AgraME

Date: 6-8 March

Location: Dubai, UAE

With a more targeted focus on the Crop Farming, Animal Farming, Aquaculture and Animal Health sectors, AgraME 2018 will help increase food security and attract buyers looking to source the latest products and innovative solutions.

[www.agramiddleeast.com/en/Home](http://www.agramiddleeast.com/en/Home)

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## North Central Avian Disease Conference

Date: 12-13 March

Location: Minneapolis, Minnesota, USA

The North Central Avian Disease Conference (NCADC) will be held in conjunction with the 2018 MPF Convention and features a variety of scientific presentations and a symposium.

[www.agramiddleeast.com/en/Home](http://www.agramiddleeast.com/en/Home)

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## Midwest Poultry Federation Convention

Date: 12-13 March

Location: Minneapolis, Minnesota, USA

The Midwest Poultry Federation (MPF) Convention is the largest regional poultry show in the US. In 2017, the convention drew over 3,200 participants from 36 states as well as Washington DC, 4 Canadian provinces and several other countries. In 2017, we celebrated our 20th and last year in Saint Paul and welcomed participants from all segments of the poultry industry – egg layer, broiler, turkey and organic/specialty poultry production. The convention, as always, featured an exceptional Education Program and trade show, along with pre-show events.

[www.midwestpoultry.com](http://www.midwestpoultry.com)

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host to AgraME 2018 in  
Dubai, UAE

## Asia Pacific Poultry Conference

Date: 25-27 March

Location: Bangkok, Thailand

This is a stage of knowledge-sharing from world-class speakers with local experienced speakers and participants. The information shared will be up to date and practical.

[www.appc2018.com](http://www.appc2018.com)

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## VICTAM Asia

Date: 27-28 March

Location: Bangkok, Thailand

VICTAM Asia is firmly established as the event dedicated to the animal feed processing, grain processing, ingredients & additives, aquafeed, and pet food industries within Asia. The exhibition is a 'one stop' show for the decision makers within these industries. Each visitor will be able to find what he or she is looking for, all under one roof over three days. The event also focuses on a series of high quality industry conferences and business matchmaking with colleagues and clients.

[www.victamasiam.com](http://www.victamasiam.com)

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