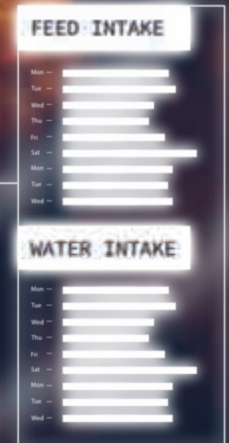


Poultry Digital



Internet of poultry

How IoT technology will shape the future of the industry

Inside the Technology issue | How producers can profit from predictive data • How solar lightens the load for free-range egg farming • A data-driven hatchery • Backyard poultry empowers women and addresses malnutrition in India • Q&A with Octopus Robots • Reader Q&A with Mike Colley



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FROM THE EDITOR

“Data will drive the future of poultry”

IPPE 2019 was a record-breaking year. Over 36,000 visitors were at the year’s biggest poultry event and even with the new addition of a third hall, exhibitors and their stands were full each day of the show.

That being said, we made sure to visit as many stands as possible to get a feel for how industry leaders are striving to optimise poultry and egg production from farm to fork. We learned especially that data and technology are not only already playing a key role in this process but can offer a great deal more as big data and artificial intelligence technologies continue to mature.

In this issue of *Poultry Digital Magazine*, we feature some of the industry’s up and coming agritech leaders. First meet Intelia ([page 12](#)), who is working to deliver sensors, data solutions and artificial intelligence technologies to the producer. We also speak with CEO of LIVEgg Alon Blum ([page 22](#)) whose company is optimising hatch yields by using data analytics and machine learning to improve chick quality and quantity.

Our country focus column makes a return in this issue with a look at India and a government incentive which seeks to empower women in rural communities by setting them up with chickens and the equipment to raise them in an effort to help them overcome poverty ([page 24](#)).

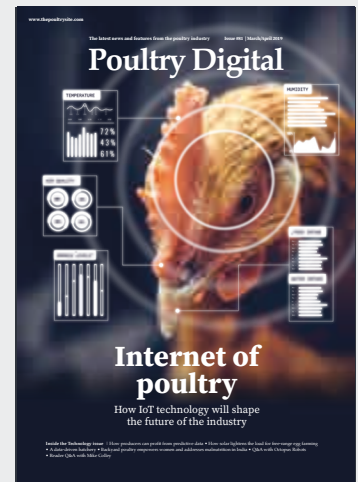
Also featured is our interview with Octopus Robots CEO Olivier Somville, who gives us his insight into poultry technology and why he feels the poultry industry in particular is so receptive to innovations and new technology ([page 20](#)).

Finally, meet Llyr Jones, a Welsh farmer who farms eggs as well as the sun for heat and power ([page 16](#)). He hosts us at his farm to show us how effective and worthwhile it can be to incorporate renewable tech into one’s production.

Ryan Johnson | Editor



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One year after speaking with Caroline Forest about how she thinks data will shape the future of poultry, we met with her at IPPE to discuss her own company's initiatives to not only optimise production, but predict it.

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CEO Alon Blum spoke with us at IPPE about how data and machine learning can improve the quality and quantity of chick yield.

24 Focus on India

To empower women to lift themselves and their families out of poverty, the Indian government has distributed chickens and the equipment needed to rear them to families in rural locations. Basudev Mahapatra met with one of these women to get her views on the importance of such programmes.

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Beautifully black from beak to bone, the Kadaknath is known by many names from India to Indonesia, where it is revered by communities not only as a food source, but as an important part of culture and tradition.

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Plan your poultry schedule with our round-up of the most important events and conferences for 2019.

Genetic study seeks to prevent foodborne infection caused by salmonella

BRAZIL 25 FEBRUARY 2019

A project presented at FAPESP Week London identifies genes that allow bacteria to survive in the digestive tract of poultry and thus infect humans



A group of researchers from the School of Agricultural and Veterinary Sciences, at the State University of São Paulo (FCAV-UNESP) in Jaboticabal, are investigating genes that are important for the survival of the bacterial species Salmonella in the intestinal tract of poultry. The goal is to prevent foodborne infections in humans.

There are more than 2,600 known serotypes of Salmonella. Some are responsible for many cases of infection in animals and humans. The presence of certain serotypes in Brazilian poultry products has caused the European Community to block containers exported by Brazil. European law is quite restrictive when it comes to the presence of these bacteria.

“Salmonella easily colonises the digestive tract of poultry and may or may not cause disease. Even when they do not affect the chickens themselves, they are able to infect humans who eat the chicken,” said Angelo Berchieri Junior, a professor at FCAV-UNESP during a session at FAPESP Week London held February 11-12, 2019.

Berchieri is responsible for a São

Paulo Research Foundation - FAPESP funded Thematic Project that will test the effects of deleting *ttrA* and *pduA* genes from three serotypes of Salmonella: Salmonella Enteritidis, S. Typhimurium and S. Heidelberg.

“We selected these three serotypes because they are frequently found in poultry and may cause foodborne infections in humans,” said Berchieri.

The researcher explained that of the three, S. Heidelberg is the least common among humans. However, it was found in the Brazilian poultry shipments that were not accepted in Europe. “The serotype is widespread in Brazil and could compromise Brazilian exports,” he said.

Brazilian law specifically restricts serotypes Enteritidis and Typhimurium. However, depending on the country of import, other serotypes of Salmonella in exported poultry products may also come under restrictions.

Also taking part in the project is post-doc Mauro de Mesquita Souza Saraiva and biologist Gabriele Tostes Gricio, recipient of a technical training scholarship.

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

NFU 2019: Focusing on the future of poultry

UK 21 FEBRUARY 2019

Poultry and egg experts discuss future trends at the National Farmers' Union 2019 conference

“Poultry meat is without doubt the protein of the future,” according to a trade expert on the panel of the poultry session at the [NFU's Conference](#).

2 Sisters Food group executive director, Philip Wilkinson said there was no doubt that poultry was the key to feeding the anticipated global population increase and it was up to the industry to grasp the opportunity.

A strong line-up of industry experts ran the rule over poultry's priorities for 2019 and its place in future domestic and international markets.

The programme for the Our Food, Our Future sector break-out session (20 February, 9am, ICC Birmingham) included a horizon-scanning presentation from NFU Poultry Chairman Thomas Wornham, who outlined his board's work plans ahead of a year of unprecedented change. These include calling for British sourcing of liquid egg, calling for retailers to work with industry to improve carcass balance; exploring alternative feeds; safeguarding British welfare standards during trade talks and emphasising the industry's reliance on non-UK labour.

The NFU Poultry Board would like to continue to develop career opportunities within the sector as well as raising awareness of biosecurity as a way of preventing exotic and endemic diseases to all poultry keepers. It also wants to promote poultry products as part of a healthy balanced diet.

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



NFU 2019 | NFU National Poultry Board chairman Thomas Wornham

Government urges preparation for a no-deal Brexit

UK 20 FEBRUARY 2019

New guidance has been published to ensure import and export trade in animals, animal products, fish, food and feed can continue in the event that the UK leaves the EU without a deal

This guidance will help to minimise disruption for users and allow the continued movement of goods, while helping to maintain our biosecurity, food safety and high standards of animal welfare.

In the event of a no-deal, to continue to export to the EU we will need to be listed by the EU as a third country. Negotiations are under way to secure this listing and we are confident it will be in place before we leave the EU. In a no-deal exit the process for exporting and importing the products above but will change in the following ways:

- As we've said previously, businesses exporting all animals, animal

products and fish to the EU will now need to apply for an Export Health Certificate (EHC) before they export. This will make them the same as businesses who export these goods to the rest of the world who already have to apply for EHCs. They will also need to make sure their trade route passes through a Border Inspection Posts when entering Europe as well as being aware of wider customs requirements. The [guidance](#) and certificates are available for download from today ahead of use on exit day.

- For those businesses importing to the UK, there will not be any new

checks or requirements but importers will need to notify authorities using a new process. Businesses will need to use a new system called the [Import of Products, Animals, Food and Feed System \(IPAFFS\)](#). This will help to minimise disruption for users, allow the continued movement of goods and help to maintain our biosecurity and food safety.

- Businesses importing animals and animal products from within the EU will need to use a separate interim system until the summer.

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

EggTester.com

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www.eggtester.com



Scientists make gene-edited chickens in bid to halt next pandemic

UK 22 JANUARY 2019

British scientists are developing gene-edited chickens designed to be totally resistant to flu in a new approach to trying to stop the next deadly human pandemic



The first of the transgenic chicks will be hatched later this year at the Roslin Institute at the University of Edinburgh in Scotland, said Wendy Barclay, a professor of virology at Imperial College London who is co-leading the project.

The birds' DNA has been altered using a new gene editing technology known as CRISPR. In this case the "edits" are to remove parts of a protein on which the flu virus normally depends, making the chickens totally flu-resistant.

The idea is to generate poultry that cannot get flu and would form a "buffer between wild birds and humans", Barclay said.

Global health and infectious disease specialists cite the threat of a human flu pandemic as one of their biggest concerns.

The death toll in the last flu pandemic in 2009/10 - caused by the H1N1 strain and considered to be relatively mild - was around half a million people worldwide. The historic 1918 Spanish flu killed around 50 million people.

The greatest fear now is that a deadly strain could jump from wild birds via poultry into humans, and then mutate into a pandemic airborne form that can pass easily between people.

"If we could prevent influenza virus crossing from wild birds into chickens, we would stop the next pandemic at source," said Barclay.

In research published in 2016 in the journal *Nature*, Barclay's team found that a gene present in chickens called ANP32 encodes a protein that all flu viruses depend on to infect a host. Laboratory tests of cells engineered to lack the gene showed they cannot be infected with flu.

Teaming up scientists at the Roslin, Barclay said the plan is to use CRISPR to edit the chicks' DNA so that only one part of the key protein is changed, leaving the rest of the bird exactly the same, genetically, as it was before.

Words: Kate Kelland, Health and Science Correspondent, Reuters

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

EU agrees no-deal Brexit compensation for Irish farmers

EU 05 FEBRUARY 2019



The European Commission has agreed to compensate Irish farmers for a collapse in beef and dairy prices in the event of a no-deal Brexit, the Irish edition of the *Sunday Times* newspaper said, quoting Irish government and EU sources

Farmers would be in line for hundreds of millions of euros in emergency aid to offset a market collapse and the loss of British customers, the newspaper reported. Agriculture Minister Michael Creed said last month Dublin would seek that amount for its farming and fishing industry.

With close trading links with Britain, especially in labour intensive sectors like agri-food, Ireland's export-led economy is considered the most vulnerable of the remaining 27 European Union members to a disruptive exit by its neighbour.

The details of the scheme were finalised between Creed and the commission's agriculture chief Phil Hogan, the report said.

A spokesman for Creed said the two met last Monday to discuss the potential impact of a disorderly Brexit on the Irish agri-food and fisheries sectors.

In a statement, the minister said he had stressed the need to deploy market response measures, including exceptional aid, and that Commissioner Hogan reiterated the EU's readiness to respond and support Ireland.

A spokesperson for the Commission could not immediately be reached for comment.

The *Sunday Times* said the compensation, similar to measures taken when Russia banned EU farm produce, could also apply to Dutch and Belgian flower producers and Danish dairy and bacon farmers, all of whom export heavily to Britain.

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

Brazil to restart high-level talks with China, could boost farm trade

BRAZIL 01 FEBRUARY 2019

Brazil and China are expected to hold their first high-level political and economic talks since 2015 later this year, Brazil's agriculture trade secretary told Reuters, in a move likely to boost farm trade between the two countries



The first meeting of the China-Brazil High-Level Coordination and Cooperation Committee (Cosban), last convened under former President Dilma Rousseff, is "very probable" for the second half of the year, said Orlando Leite Ribeiro, who oversees trade and international relations at the Agriculture Ministry.

The meeting should advance talks to permit more Brazilian meatpackers to export to China and to accelerate Chinese approvals of genetically modified (GMO) products, Ribeiro said in an interview.

China is Brazil's largest trade partner and is the top importer of Brazilian soy and beef.

Brazil exports to China totaled \$64.2 billion in value last year, up 35 percent year-on-year, thanks in part as China boosted its soy imports from the South American country amid a trade war with the United States.

China sent a delegation to Brazil in December to visit factories producing beef, poultry and donkey, with an eye on allowing more plants to export.

"Our expectation is that this will result in openings. This is a very important year with China, we will have Cosban, so I want to believe that

this year we will have good news, major advancements," Ribeiro said.

Regarding GMO approvals, Brazilian farmers often cannot use the latest seed technology over concerns they will not be able to sell their crop to China, he said.

Some products have waited more than two years for approval, after China reduced the frequency of approval meetings several years ago, Ribeiro said.

"The expectation is to restart these talks and that we will speed up the process of approvals," he said.

Cosban talks had been halted because they were usually led by the vice president, a position left vacant when Michel Temer assumed the presidency after Rousseff was impeached in 2016.

Regarding a clampdown earlier this month by Saudi Arabia on Brazilian poultry plants permitted to export, Ribeiro said more plants were affected than previously disclosed by meatpackers association ABPA.

Reporting by Jake Spring; Editing by Bernadette Baum, Reuters

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

BFREPA finds gross imbalance in egg supply contracts

UK 17 JANUARY 2019

The British Free Range Egg Producers Association is seeking to reform supply contracts between farmers and packers after lawyers found terms of agreements are grossly imbalanced in favour of buyers

A team of legal experts from Birketts LLP examined contracts provided by producers and found numerous areas requiring improvement.

They include pricing and payment terms – which vary massively between agreements – and termination which, in some cases, is weighted entirely towards packers.

BFREPA chief executive Robert Gooch has today opened up a dialog with 41 packers outlining the organisation's areas of concern and asking for feedback.

Following consultation BFREPA will deliver on its pledge to draw up model contracts which will be available to its members to enable them to secure fairer terms when negotiating with customers.

Robert Gooch said: "Producers have a right to a fair contract which gives them confidence to continue to invest in their businesses and produce a great product.

"Our findings are that contracts are very one sided in favour of the buyer, which is to be expected when it is the packer offering the terms.

"Our end game is to arm free range producers with a model contract which stands up to legal scrutiny. This can be used as a barometer for fairness when producers are offered contracts in the future."

The consultation will close in February when work will begin on drawing up the model contracts.



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

Water utilisation in broilers

An increased society focus on the use of global resources in recent years means that livestock production systems are rarely discussed without some consideration of sustainability being made. More and more, a balance must be found between global population growth and the increased demand for meat, and the environmental impacts of livestock production and the scarcity of natural resources such as agricultural land and also water.

Water is a key nutrient for all living things and its use by both humans and livestock must be sustainable and responsible.

For broilers, water intake can be considered an optimum trait.

- Low water intake can result in reduced feed intake and flock health issues.
- Excessive water intake can be indicative of gut health issues and increases the occurrence of wet litter and the ventilation requirements of a house (Aviagen estimates show that around 70 - 80 percent of the water consumed by a broiler is excreted either as droppings or expelled as moisture which then needs to be removed from the house).

Ensuring broilers optimise their water intake not only promotes the sustainability of broiler production through its influence on energy (ventilation) and water use, but also maximises broiler health, welfare, and production. The routine on-farm recording of water intake is a key management practice which can help to identify potential health or management issues. Understanding drinking behavior allows best practice drinking management to be put in place so that the preferred drinking behavior of a flock can be supported and promoted.

Water intake and gut health

It is common for birds to increase their water intake during an intestinal disturbance (Figure 1); therefore any sudden fluctuations in water intake may indicate the onset of intestinal issues and must be investigated. Birds often drink more water as a means to cool down when they get too hot, therefore prolonged periods of elevated water intake may be a sign of heat stress which is known to reduce intestinal integrity. Excessive water intakes can also be an indication of high mineral levels (particularly sodium) in the water the birds are drinking. Therefore, it is important to analyse the water being provided to the birds if water intake is excessive. The impact of increased water in the gut can decrease feed transit time through the gut which in turn can reduce the efficiency of the gut and increase the risk of dysbacteriosis. Furthermore,

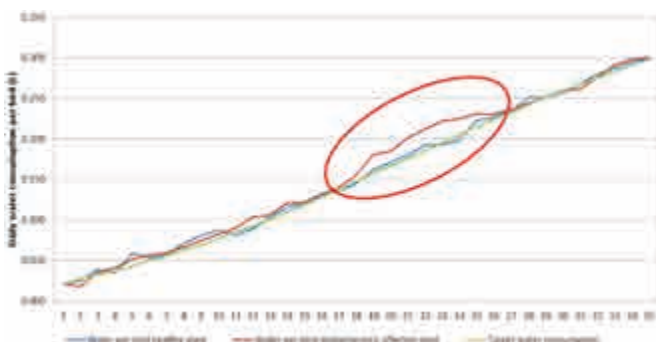


FIGURE 1 | Daily water consumption of healthy birds compared to birds with dysbacteriosis

increased moisture in the gut results in wetter feces which can increase litter moisture; wetter litter provides a more favorable environment for the parasite *Eimeria* and thus increases the risk of coccidiosis. It is important to monitor water intake as increased water intake, whether sudden or prolonged, can be indicative of direct intestinal health issues or highlight management issues which could impact upon intestinal health.



Key times for water intake

Water intake records in thousands of individual birds in the Aviagen breeding programme indicate that the daily pattern of water intake is, as might be expected, similar to that of feeding. Like feeding, most drinking takes place when the lights are on with little drinking occurring in the dark. The time spent at the drinkers is highest in the period immediately after the lights have been switched on and water consumption is fairly evenly spread out throughout the day thereafter (Figure 2). Time spent at the drinker after the lights are switched on is influenced by the length of the dark period given; the longer the dark period, the higher the proportion of time spent at the drinkers when the lights are turned on (Figure 2). Birds clearly learn when lights are going to go off as there is a reduction in water intake prior to the lights being turned off. This is particularly obvious immediately prior to the longer of the two dark periods.

Understanding how water intake is distributed across the day and how diurnal patterns of light and dark affect water intake, allows the appropriate management of drinking equipment and supply of water to take place so that optimal water intake can occur. In order to allow birds to drink as they would prefer it is important to make sure that all birds have unrestricted access to water at all times when the lights are on, this is particularly important immediately after the lights come on.

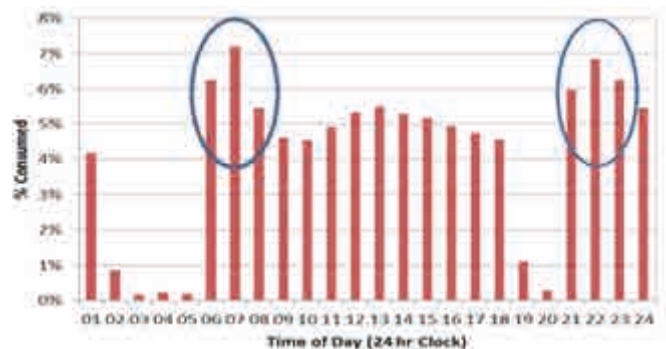


FIGURE 2 | Distribution of water consumption during a day. The red circles highlight the increased water intake in the period immediately after the lights are switched on (5am and 8pm)

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This means ensuring that:

- Recommended drinking space is provided (Table 1).
- Adequate water flow rates are in place (Table 2).
- There are no physical barriers to the drinkers.
- Blocked nipples are replaced.
- Drinkers are well-maintained and kept in a good state of repair.
- Water pressure is correct for bird age and number.
- A clear and proven cleaning and disinfection programme is followed.

Drinker type	Requirements
Nipple drinkers	<3kg (6.6lbs) 12 birds per nipple >3kg (6.6lbs) 9 birds per nipple
Bell drinkers	8 drinkers (40cm/17in) per 100 birds

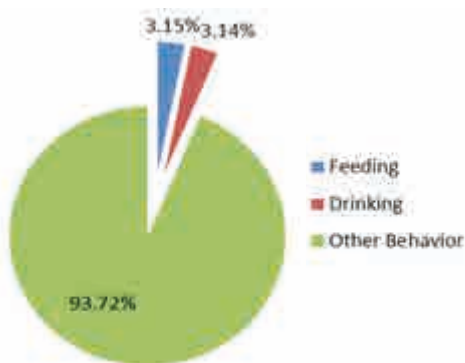
TABLE 1 | Minimum drinker requirements per 1000 broilers post brooding

Age	Flow rates
Up to 7 days	60ml/min
7 - 14 days	70ml/min
14 - 21 days	80ml/min
21 - 28 days	90ml/min
28 days and older	100ml/min

TABLE 2 | Recommended flow rates for nipple drinkers

When the total percentage of time birds spend drinking in a day, as a proportion of the total time the lights are on in a day, is compared to the amount of time spent completing other behaviors, the time spent drinking is relatively small (Figure 3). Data collected from Aviagen shows that birds under good environmental and management conditions when fed a good quality pelleted feed and given access to an open water source (open drinking cups), spend, on average, approximately 6% of their time drinking and feeding. This data shows that the modern broiler does not need to spend a significant amount of time feeding and drinking in order to satisfy its requirements for growth and maintenance.

Time spent drinking (and feeding) will vary depending on temperature, feed type and drinker type. If a mash or poorer quality feed form (with a high percentage of fines) is fed, or if nipple drinkers are used or environmental temperature is high, time spent feeding and drinking would be expected to be higher. Indeed internal data from Aviagen shows that on a



mash diet time spent feeding is approximately 3 times that of time spent feeding on a good quality pelleted diet. However,

FIGURE 3 | Proportion of time broilers spend feeding and drinking during the daylight hours (18 hours in this case)

the amount of time birds spend drinking (and feeding) is still expected to remain fairly low (less than 20 percent).

Key drinking behaviours

Drinking behavior appears to be similar to feeding behavior in that birds will have a number of drinking “bouts” in a day, in the same way that they have a number of feeding bouts or meals in a day. Each bout of drinking consists of several ‘visits’ to the drinker, with each visit being separated by a short period of time. This is also seen during feeding where a meal consists of several visits to the feeder each separated by a short period of time. Once a drinking bout (or meal) is completed, there will be a longer period of time during which the birds will not visit the drinker.

This is important for a number of reasons. Firstly, it highlights the close link between feeding and drinking behavior and the importance of placing feeders and drinkers in close proximity to each other to allow birds to move freely to and from the drinkers during feeding. It also highlights the importance of establishing good feeding and drinking behavior right from flock placement by ensuring that good brooding practices are in place (appropriate environment, easy and unlimited access to feed and water). This will ensure birds are able to feed and drink in their preferred way optimising feed and water intake, flock performance and overall flock health and welfare.

Secondly, if a drinking bout is interrupted or disturbed due to management practices such as weighing or vaccination, or high competition for access to drinkers as a result of an inadequate number of drinkers being supplied, this will impact on drinking behavior and possibly water intake. Birds do not go to the drinker and consume all they need in one visit and must be allowed to go to and from the drinkers freely until they have completed a drinking bout. If birds are unable to return to a drinker to finish a drinking bout, this will result in reduced water and possibly feed intake.

It is estimated, from internal data, that birds have around 16 drinking bouts a day (although this will vary with age) which are fairly evenly spread across the day and that each bout consists of approximately 3 visits to the drinker. However, individual birds will have their own individual drinking behavior, and drinking bout number and duration, and the number of visits within a bout will vary between birds.

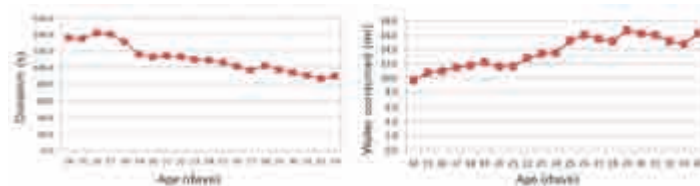


FIGURE 4 | Changes in drinking bout duration and amount of water consumed with age

As birds age, the average duration of a drinking bout declines but the amount of water consumed per bout increases (Figure 4), as does the rate of water intake (Figure 5).

Appropriate increases in flow rate with age must occur to account for the increased rate of drinking as birds grow (Table 1).

Although the average number of drinking bouts in a day is estimated to be around 16, the actual number of bouts in a day increases with bird age (Figure 6). Water provision, number of drinkers and drinking space must be adequate for flock size and the increased water intake with age. In particular drinking space must be adequate for the flock at older ages as this is when drinking requirements will be at their highest.

Inadequate water supply can result in reduced feed intake and

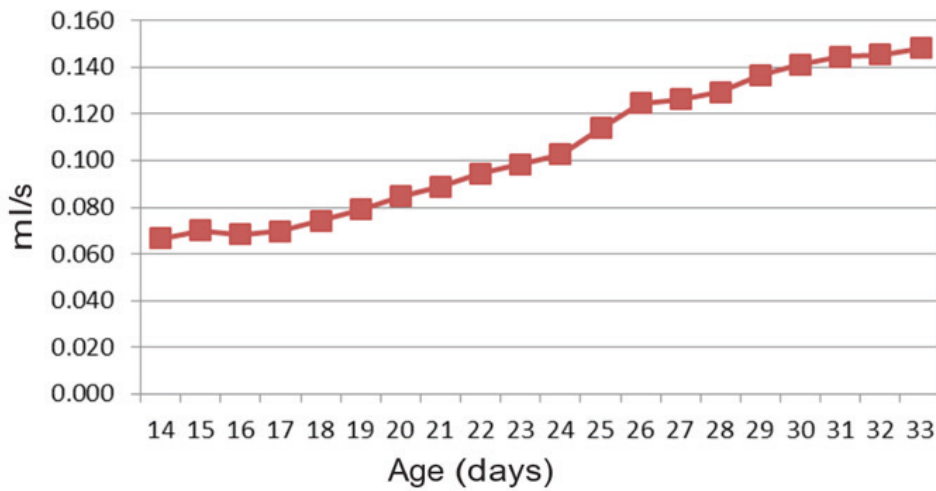


FIGURE 5 | Changes in drinking rate with age

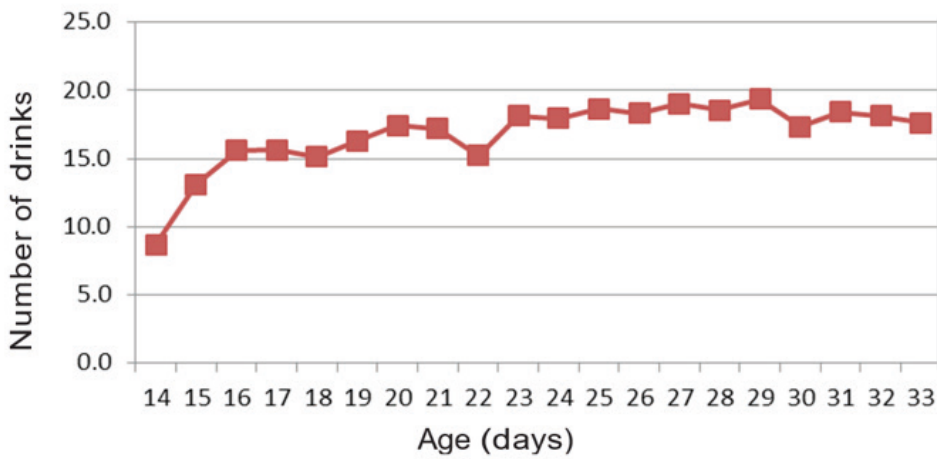


FIGURE 6 | Changes in number of drinking bouts with age

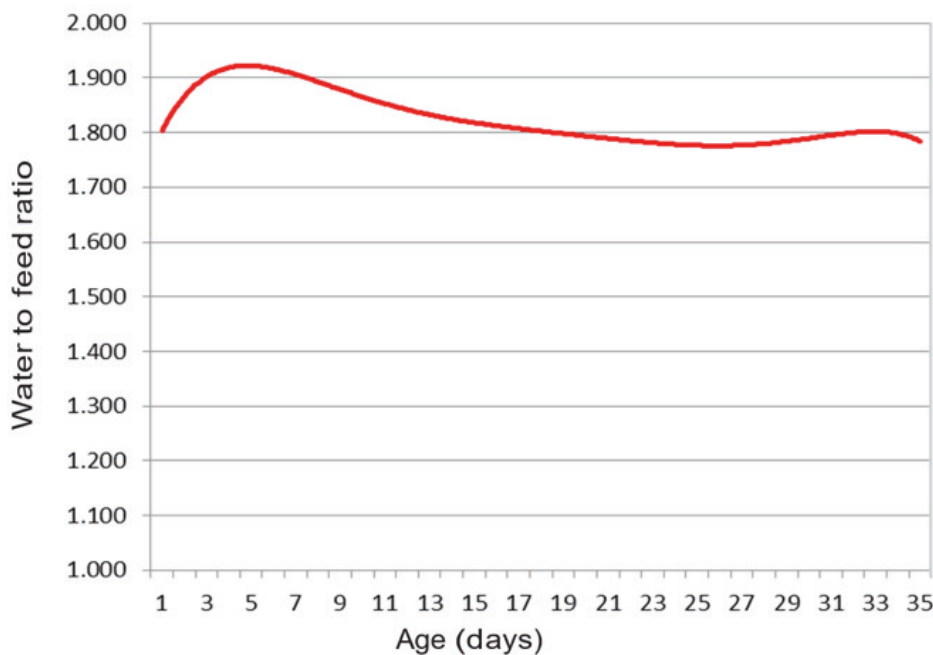


FIGURE 7 | Changes in ratio of water intake to feed intake with age in broilers on nipple drinkers

health issues, and changes in water consumption are an early indication of health and performance issues. The ratio of water intake to feed intake can be a good way of determining whether or not water consumption is adequate. Water consumption and water to feed ratio should be measured daily to ensure birds are receiving enough water. At Aviagen it is recommended that at 21oC (69.8oF), birds will be consuming enough water if the ratio of water to feed is between 1.6 and 1.8:1 (depending on drinker type and environmental conditions). Data on water consumption collected routinely from broiler trials run in The Netherlands confirms that on average this recommendation is correct (Figure 7).

Conclusions

Knowledge about drinking behavior provides valuable information which not only allows best practice management to be implemented but also provides the possibility of being able to select for those birds with optimum water intake, allowing:

- The key components and motivations of drinking behavior to be understood so that the management of drinkers and provision of water can be optimised to allow birds to fulfil their preferred drinking behavior.
- Optimisation of water intake.
- To limit the impact of excessive water intake on gut health, bird health and welfare, and ventilation requirements.
- Sustainable production by avoiding excessive water and energy (ventilation) use.

Best practice management for water intake is:

- Early development of feeding and drinking behavior.
- Daily monitoring and analysis of water consumption and feed to water ratio.
- Following published guidelines for stocking density, feeding and drinking space and flow rates.
- Good maintenance programme for drinker lines - includes faulty nipples, regulators.

How producers can profit from predictive data



Words Ryan Johnson

A year ago we featured Caroline Forest, of agritech company Intelia, who gave us her perspective on how data is revolutionising the poultry industry. We caught up with her at IPPE 2019 to learn about her company's new technology and what it can do for producers

Based in Québec, Canada, Caroline Forest has spent most of her career in agriculture working in greenhouses and supplying equipment to growers, before coming to Intelia three and a half years ago. As chief marketing and sales officer at the agritech company, her role is to help them launch the data analytics side of the business and to help producers see what it can do for them.

“Visibility into what could happen before it happens”

Intelia's offerings include Internet of Things (IoT) devices and sensors for the poultry house. Such equipment can be used to capture such metrics as static pressure, bird weight, light levels, temperature, power to fans and equipment, ammonia levels, water usage, humidity and feed-bin weight.

Each sensor sends its data to a cloud-based management system where producers can view their data in an easy-to-interpret format.

“It's a little bit like a black box on an airplane. You have a black box on a plane no matter if it's an Airbus or a

Bombardier – they all have a black box.

“Well, we instal the black box in the chicken house. And then we pull the data from that house and we bring the data on to a web-based platform, where you can see all of your houses in real time and where you can do cross analysis.”

What sets them apart

Such technologies are becoming increasingly available to both broiler and egg producers, but many agritech firms, such as Hotraco Agri, Jansen and Greengage, to name only a few, as well as Intelia, are all still trying to build their respective niches.

“We also augment the data by pulling



“Many producers we spoke with are eager to adopt new technology that can help overcome roadblocks to production, or at least to gain the tools to see them coming”

it through predictive models, giving you visibility into what could happen before it happens,” says Caroline, arguing that this is the main point of difference between Intelia and similar companies operating in the space.

“We do predictive models. We don’t just do beautiful graphs and dashboards. We also predict stuff” – and accurately, asserts Caroline.

With broiler production becoming increasingly competitive, anything to take the uncertainty out of things is a welcome change. Many producers we spoke with are eager to adopt new technology that can help overcome roadblocks to production, or at least to gain the tools to see them coming. If they do face any challenges, the data from such systems can go a long way to pinpoint-

ing the causes.

In Intelia’s case, the value the data bring to the producer is in broiler weight predictions. They take data from their IoT sensors, many of which they have designed themselves, send that data to the cloud in real time and





process it to give accurate insights to producers. This system is called the COMPASS Data Analytics Platform, and it is powered by artificial intelligence.

“That’s where you add value,” says Caroline. “You process data and you don’t just supply more data to the producer. You give them insight with which they can take actions.”

So what kind of insights does Intelia provide?

“We provide producers with 14 days of visibility into their weight prediction.” Caroline shows me a model on a screen in front of us, displaying data from an actual broiler house in Canada. “You can see that today these birds are at 0.88lb [0.4kg]. You can see here how that weight is going to evolve over the next 14 days.

“For example, let’s say the target weight is 2.5lb [1.1kg]. That’d be a very light bird, but I can tell you that bird will reach that weight at exactly 4:30pm on 17 February 2019.”

As impressive as this predictive modelling is, any producer will want to know how accurate such predictions are. If producers are going to make important decisions about their operations, insights ought not only to be timely, but close to reality as well.

This prediction, because it’s in the later part of the 14-day period, has an error margin of just 0.25lb (+/- 0.125 lb). When the prediction is 7 days or less, the error margin is even smaller at around 0.125 lbs (+/- 0.0625lb).

“It’s a self-learning algorithm, so the more flocks you do with our system, the

greater the accuracy will be. It takes into consideration not only the current flock, but all of the past flocks it’s had in this house with this breed.”

What producers can do with predictive modelling

At the farm level, such prediction allows producers to see if their birds are due to be moved next Thursday, for example, and if the birds will have reached target weight by that time.

“But if the birds are going to be above that weight,” says Caroline, “well, the producer could just adjust the lighting to provide more darkness hours, so the birds will eat a little less and that will slow the growth curve a little.”

Alternatively, if the birds were going



to be too light, she explains, then the producer could stimulate the birds with more lighting so that they would eat a bit more.

“It’s not a fool-proof science,” says Caroline, “but at least you have a chance, and you have that visibility – you have 14 days to correct anything that isn’t right, or if it’s not going in the direction you want.”

Which is much better than discovering whether birds were too heavy or too light when the settlement report comes at the end of the flock – which is usually when producers find these things out.

The practicality doesn’t end in the chicken house, though. Processors or integrators can use this data to establish a catching schedule based exactly on what they need.

Caroline says: “They have a sales call, for example, that calls for, say, 25,000 chickens of 5lb. They can look at this dashboard and look at all the farms they have connected, find the sev-

en-day weight prediction and sort them so that they can see which houses will meet the 5lb target weight that the sales forecast is calling for.”

Rewarded by processors

I ask Caroline about how this technology has actually been received by producers so far. “They really, really like it because it allows them to be in that sweet spot, where they get a premium for their chicken and they get rewarded by the processor and integrator for providing a chicken that’s in the best weight range.”

It’s a system that works across borders as well. Intelia is currently operating in the US and Canada, and has recent embarked on a project in Mexico. Caroline says that you can adapt the system to your unique context. For example in Canada, where poultry meat is not vertically integrated, producers can use access to their data as a negotiating tool for discounts on feed prices or a premium price for their chicken.

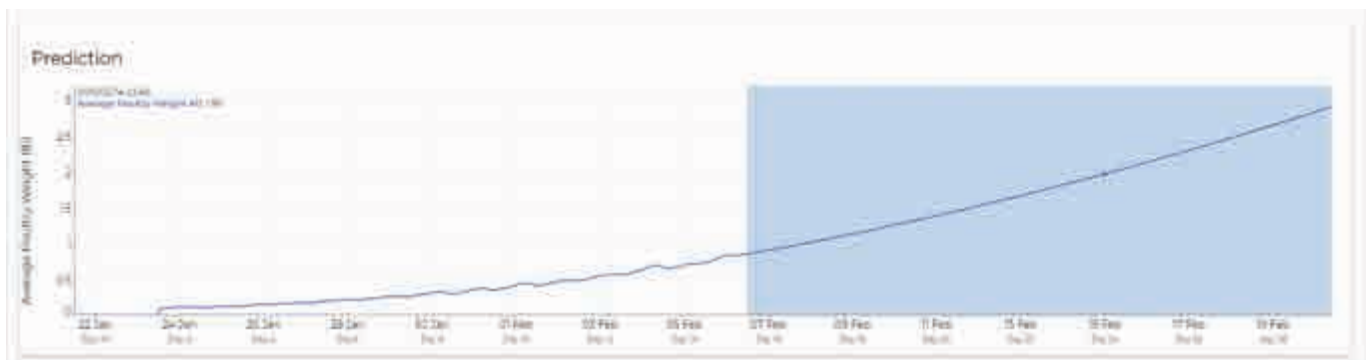
Caroline assures me that producers’ data is kept extremely secure, and producers have the rights to their own data and can deactivate access if they choose to. The producer, in this way, maintains their independence and decisions about production ultimately remain on the farm level.

“Independence is important,” Caroline explains, “because the producer is paid for that work and should have responsibility for it. Our system helps struggling farmers benefit from the insight it can provide.”

When it comes to set-up, Intelia’s system can integrate with the majority of third-party sensors, so producers aren’t required to purchase anything new – with the exception of those sensors which are required for the predictive modelling. In that case, Caroline adds, Intelia offers a bundle so that the price of equipment is included in the monthly subscription to access the platform.

It may not be long until we hear from Intelia again, since they are currently working on a variety of other predictive models to make producers’ lives easier. “We’re here for the farmer,” concludes Caroline. PD

“Intelialia is currently operating in the US and Canada, and has recent embarked on a project in Mexico”



How solar lightens the load for free-range egg farming

Words Ryan Johnson

For free-range producers, solar energy and ground-source heating could prove a powerful combination – both in saving on emissions and saving on costs – as one egg farm in North Wales demonstrates.

Nestled in the rolling hills of North Wales are 16,000 chickens foraging on 20 acres of green, sloping pasture overlooking the gentle peaks of Conwy County Borough’s agricultural countryside.

Watching over these hens is farmer Llyr Jones near Llanfihangel Glyn Myfyr, who farms 1,600 acres and whose portfolio of produce also includes sheep and Wales’s own cold-pressed rapeseed oil, called **Blodyn Aur**, of which Llyr produces 6,000 bottles a year.

Farming since he could walk, Llyr has got into egg production over the last three years, seeking to diversify his enterprise in the light of uncertainties around Brexit and the falling price of lamb and beef, as well as reductions in subsidies.

Even without such uncertainties, egg producers are under constant pressure. Whether ensuring optimal performance or keeping strict biosecurity, the last thing any producer needs is financial uncertainty.

In an effort to reduce this pressure and for greater on-farm efficiency, Llyr reached out to **Hafod Renewables**, a leading, Wales-based installer of renewable-energy technologies run by father and son Richard and David Jones.

The result of their collaboration? Low-cost, passive heating supplied to Llyr’s free-range layer house by means of 2,000

metres of piping, buried a metre beneath the ground (upon which sheep are now happily grazing), and a heat exchanger, which is further powered by solar panels on top of the house.

Hassle-free heating

Compared to conventional heating systems, ground-source heating requires little to no maintenance. There’s an annual inspection conducted by the installer, and aside from the initial set-up, not much is required of the producer in terms of daily duties.

Discussing the initial set-up, David points to two big black pipes next to where we are sitting in Llyr’s farm office. “Those pipes go out into the field where [the rest of the] pipework is buried... That all had to get buried, so there was a lot of excavations and civil works, filling with sand and back-filling.

“Then we had to fit the heat pump,

“Compared to conventional heating systems, ground-source heating requires little to no maintenance”



which collects all the hot water and distributes it to the heating systems, which are fan blowers all around the property. It took about three to four weeks to instal, but it’s all fairly straightforward,” says David.

Llyr says: “I looked at biomass, where you cut trees and put them in the boiler. I have a few friends doing that. One friend – he’s constantly chainsawing and cutting trees and every day he’s having to load it up and check on things. The price of wood has shot up too.

“He’s... well, you can tell he’s getting fed up with it. But for this, I don’t have to do anything. Like on Sunday I’d rather be in bed than having to get up and feed the boiler,” adds Llyr.

When it came to the initial set-up, Llyr says the only obstacle was the terrain: “We have a lot of rocks.”

Cost savings

In addition to being easy to set up, the benefit of using ground source heating in terms of cost is hard to deny. “It’s free energy once you set it up. And it’s pretty much free to run,” says David. Especially if you pair it with something like solar panels, adds Llyr.

“Ground-source heating is 70 percent cheaper than direct electricity, 50 percent cheaper than oil and 60 percent cheaper than LBG (low-BTU gas). All totalled, producers can save between £7,000 and £11,000 per year”



Up front, the cost is around £55,000, which includes the pipework, fitting out and all the internal works, but with the UK's [Renewable Heat Incentive Scheme](#) (RHI), producers can expect to save thousands per year.

Ground-source heating is 70 percent cheaper than direct electricity, 50 percent cheaper than oil and 60 percent cheaper than LBG (low-BTU gas). All totalled, producers can save between £7,000 and £11,000 per year, says David.

Hafod is not just a fitter and installer, adds David, but also services the system, has a crew ready to hand in case of any breakdowns and offers maintenance for anything to do with the heat pump – and they even offer support with the documentation to get the grants from the RHI.

Savings can be turned into profit as well, it seems. The more integrated, the better, and Llyr is actually producing more power than he uses between his solar panels and a small hydro set-up he also operates when the creek runs in the spring.

The cost savings are even greater when compared to other types of

“The cost savings are even greater when compared to other types of heating and the inputs they require”

heating and the inputs they require, such as biomass, which requires large quantities of purchased wood bulk and conventional heating with oil. In both cases, the purchase of commodities is required, “Whereas with ground source, the ground recharges heat so you can be self-sustaining,” says David. “It’s produced on the farm without bringing anything in. You just turn it on and that’s it.”

This also gives the producer greater independence, adds Llyr.

Environmentally friendly egg production

With consumers demanding more from producers than ever before, not only in terms of cheap, healthy and safe food, but also environmental sustainability, producers are under pressure to find

all-encompassing solutions.

Speaking to the environmental footprint of biomass heating, David says: “There’s also the carbon cycle to consider. Trees absorb carbon, but this is released when they’re cut down and burned.

“You also have to consider the actual air quality. It’s as bad as car emissions. Not to mention having to transport all that wood, sometimes from Canada, considering we don’t produce enough of it [in the UK] to supply ourselves.”

Llyr is also interested in marketing his eggs as not only high welfare (being free range), but also as environmentally friendly, which many food-assurance schemes are pushing to incorporate into their labelling, such as the [Soil Association](#) and [LEAF](#).

One thing to consider is how ground-source heating affects the soil. There is a concern that it might contribute to frost,



with too much heat being removed from the ground. However, this should be avoided by burying enough piping. “Too little pipework could possibly lead to some frost and freezing, but we put 2,000 metres of piping in there so there’s no chance that’s going to happen,” says David.

“We do check the geology beforehand, so we can make recommendations based on that as well,” he adds.

Llyr adds that he’s seen other free-range egg producers who have installed ground-source heating on their ranges. He noticed on one farm that trees planted over the piping grow slower than trees planted at the same time on parts of the range where there was no buried pipework.

Llyr and David agree this could be due to some minor moisture loss, but that planting trees over the pipework is inadvisable anyway since when in full leaf the trees would shade the ground, cooling it and reducing the amount of heat carried back to the layer house.

That said, grass returns in short order after the pipes have been buried and may be pastured with sheep or chickens as normal.

Ultimately, however, ground-source heating can actually be considered 100 percent renewable, say David, if the energy used to power the unit is derived from renewable sources. Providers such as Bulb and Octopus can offer this, and using a renewable supplier means that the ground-source heating is a carbon-neutral, sustainable form of heating.

Ammonia reduction and performance

Despite this system being easy to set up, cost effective and environmentally friendly – it has to work for the producer in terms of performance. If a technology doesn’t improve production in some capacity, many will not implement it.

“Despite this system being easy to set up, cost effective and environmentally friendly – it has to work for the producer in terms of performance”



Llyr addresses this too, however, and has observed two fundamental improvements since installing ground-source heating.

“My litter is a lot drier than normal, which helps with my ammonia levels and that has become an issue in Wales.”

Lower ammonia levels translate into healthier birds, and Llyr’s also noticed an improved eggs-per-bird ratio.

Because they’re warmer, he says, they’re eating less and putting less

energy into keeping warm: “10 percent here, 10 percent there – it all adds up. Looking at our last flock, before we had the ground-source heating, we’re now producing 11 eggs per bird more. That’s a few thousand pounds extra,” says Llyr.

“Our last flock also had more birds. So we have less birds now, but more eggs in total.”

Llyr plans to build a second layer house with the same set-up of ground-source heating and solar panels. Llyr’s egg production will be among over 100 other farms across Wales that have had Hafod Renewables instal ground-source heating systems on their land.

“We’re just farming the sun’s energy, really. The sun shines, the grass grows and we turn that energy into food. Now I’m not only farming food, but energy too. It’s great,” concludes Llyr. **PD**

Farming in focus

Meet the producers driving change in their industry

Words Ryan Johnson

Olivier Somville CEO of Octopus Robots

Is the poultry industry ready for robots? One French firm is already bringing its automated hardware to the henhouse. Olivier Somville, 53, is CEO of the company Octopus Robots (until April 2017 known as MCAI), based in the Vendée region of western France, which provides robots to aid in - among other sectors - poultry management. Up until 2012, the company was involved in developing non-contact measuring systems for industries such as automotive, aeronautics, screw, nut and bolt manufacturing. But in 2012 and 2015, it moved into other sectors and, finally, following an idea conceived by Somville, specialised in creating, “mobile, autonomous, intelligent and modular robots devoted to specific tasks one would not expect to be performed by robots”.

How did you begin working with the poultry industry?

I have a serious background in the poultry sector. A long time ago, I was running a company specialising in sensing, measuring and discriminating incubated eggs for hatcheries. Then, I took over MCAI, an SME specialising in non-contact measuring systems. My company [then] took every opportunity to diversify its product portfolio and moved into various sectors such as healthcare by developing patented technologies in the area of high-level disinfection (HLD) for surfaces. It developed an innovative airborne disinfection system, which it marketed and sold through a network of distributors worldwide.

In 2014, I made the radical decision to assign the intellectual property attached to this system in order to assemble the necessary financial resources to develop an unprecedented technology. That’s how the “Octopus programme” came about. In 2015, having studied the technical feasibility and business potential,



I decided to make very serious investments into the development of our biosafety robots. I recruited a team of experts and closely cooperated with first-class professionals working in the poultry industry. Since then, Octopus Robots has been exclusively devoted to designing and developing its range of robots and associated products.

Why do you think the poultry industry is so receptive to new technology?

It is facing tremendous challenges, and this is just the beginning. By 2050, we will see another 3 billion people inhabiting the earth. Poultry consumption is forecast to increase by 45 per cent from 2010 to 2030; it is predicted that poultry will remain the primary meat consumed all over the world, for a long time to come.

Needless to say that the poultry industry has to be proactive [to meet this challenge]. It must improve its means of production, practices and policies in matters of biosafety, quality, control, traceability and responses to the growing requirements of “prosumers” (proactively engaged consumers).

In an ultra-competitive industry, price-based competition between leading poultry producers is finding its limits and is no longer the only adjustment variable! In today’s world, poultry players must farm data, not just chickens, and, in doing so, harness new digital technologies. One of the most practical applications of digital technology is that of bots.



“Our robots help to dramatically reduce NH3 (ammonia) in sheds”

friendly as possible, so the systems are usually relatively robust, plug-and-play, one-touch systems.

We feel that robots do not threaten on-farm labor, but actually translate into better work conditions and will allow producers and their staff to focus on more important matters.

How could your technology, or future innovations in general, serve to reduce the environmental impact of poultry production?

Just one example: our robots help to dramatically reduce NH3 (ammonia) in sheds and therefore fine particulate emission or PM2.5, which is atmospheric particulate matter with a diameter of less than 2.5 micrometres.

What trends in technology do you see over the next 5 to 10 years?

Robotics is still in its early stages in the poultry industry. Like the automotive industry has done over the past 20 years, the agriculture industry is currently undergoing its own revolution by entering a new era of AgTech and Agbots. Uptake of the new technology is slow, however, there is a change in mentality and this is just the beginning. 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.

What's next for your company?

We have got many projects we cannot disclose here! We're working on new modules and accessories. [PD](#)

How did you identify a need for robotics in the poultry industry?

Initially, I was called upon to develop an innovative system making it possible to decontaminate very large buildings – hatcheries. I met with many professionals and came to the point where it was necessary to develop modular and multi-tasking equipment that was suitable for various applications – and most importantly equipment that could perform work without stopping and that is free from other constraints.



What challenges did you face in developing your robotics and how did you overcome them?

Autonomous navigation was the biggest challenge we faced in developing our robots (it is important to note that our robots are inspired by autonomous-vehicles technology). All of our robots are equipped with advanced communication and navigation systems, which facilitate optimal guidance and monitoring. They do not need human assistance during operations.

You cannot use global positioning systems (GPS) 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 just a few. Because our robots are in contact with birds and work among birds, it is paramount that they navigate safely and do not stress the flock. It has taken us a long time to develop our own systems, but the bottom line is that we have managed it.

What potential does technology have to make poultry producers' lives easier?

There are many repetitive tasks that robots could assist with, and also a lot of valuable data you can collect from robots. Most companies in the agricultural industry aim to make hi-tech systems as

LIVEgg: A data-driven hatchery

Words Ryan Johnson

At IPPE 2019, we met with a lot of up and coming innovators in the tech industry, but LIVEgg stands out for its desire to improve performance, starting in the hatchery.

Alon Blum, CEO of LIVEgg, was born in Israel where he has a wife and three children. With a background in industrial and management engineering, he has been in the poultry industry for 10 years. Before coming to LIVEgg, he worked in large poultry operations in Nigeria where he managed breeders, hatcheries and rearing houses. He also represented a number of satellite companies working in feed additives, vaccines and equipment for the poultry industry.

Bringing all this experience back home, he joined LIVEgg, an Israel-based bio-tech company founded in 2015 by Bar-am Group, a leading Israeli broiler breeding and hatching, semi-integration and biomedical engineering firm.

CrystalEgg: A hatchery that responds to what the embryo needs

Already on the market, CrystalEgg is a technology which seeks to improve not only the quantity, but the quality of chicks that leave hatcheries.

“The problem is that once you put the eggs inside the incubators, we’re only able to observe the environment around the egg – the humidity and temperature, but nothing inside of it,” explains Alon.

“CrystalEgg actually monitors the embryos’ development stage and gives a very clear observation about that.”

What CrystalEgg does, Alon explains, is monitor eggs to check which are fertile and infertile, which are alive or dead and, if there is a mortality, at what time the mortality occurred. With this information, hatcheries can give feedback to breeders about such issues as early mortality or fertility drop – issues which normally starts at the breeder level rather than the hatchery.



This early feedback is in contrast to the 21-day cycle, at the end of which a problem is observed but the hatchery may not be aware as to what that problem actually is, so they do another cycle. “Now, we’re already one and a half months later and only then, if you have a very good staff, will they tell the breeding manager that they have a problem.

“With CrystalEgg, after seven days the system will send an alert by itself to the poultry manager,” explains Alon.

Another issue the CrystalEgg system seeks to resolve is uncertainty around actual hatch numbers. By the seventh day of the cycle, Alon says that CrystalEgg is able to accurately predict exactly how many eggs will hatch, so that hatcheries can better optimise their sales and logistics, such as if there is more than one hatchery and they need to combine trucks and transportation to meet demand.

“After seven days, [the hatcher] knows how many chicks there will be and still has two weeks to plan everything. Then at the upper level, we monitor the development of the embryos, and we know how to connect between the environmental conditions and the development of the embryo inside the eggs,” Alon goes on.

In so doing, the incubation conditions can be perfected according to the embryos’ needs, which optimises the incubation process. One of the main advantages to this is that the hatch window is made shorter, so more chicks result from the same amount of eggs, with better quality and uniformity to boot, owing to conditions which respond to the specific needs of the embryos.

The question of cost is raised, but owing to CrystalEgg’s processing capabilities, only 400 of 60,000 eggs, for example, need be placed into the smart tray systems which, according to Alon, yields an accuracy of 99.5 percent.

“Our vision is to connect our system to the hatcheries’ controllers, so that the embryos will manage the hatch protocol, rather than using fixed protocols; then you will have a com-

“What sets ChickMale Saver apart from other breakout technologies is that it identifies sex without getting anything inside the egg and the test itself doesn’t cost anything”

pletely automated hatchery.”

Alon explains that their CrystalEgg technology has already been installed in several places around the globe.

LIVEgg’s mission to end male-chick culling

Another product which is in the final stages of development is LIVEgg’s in-ovo sexing technology, ChickMale Saver.

Its claim-to-fame is that it is non-invasive. “We are using the same technology [as CrystalEgg], but we are doing in-ovo sexing. It will be ready for sales in early 2020. It will actually work like a candling machine. It will not be on the trays like this,” Alon gestures towards the CrystalEgg trays, “it will be on a candling machine that, instead of taking out only the infertile eggs, it will separate between male and female embryos.

“Depending on the segment, if we are talking about layers, it will take out the eggs. If it’s a broiler or breeder, it will just separate between them so each one of them will hatch differently. We can even combine between the two products later, because if we separate between male and female, by using the CrystalEgg, we develop a way for us to give each of them a different protocol of incubation.”

What sets ChickMale Saver apart from other breakout technologies is that it identifies sex without getting anything inside the egg, and the test itself doesn’t cost anything. “Once you have the system, you have the test” unlike polymerase chain reaction (PCR) tests which cost money, explains Alon.

Why it matters

The other benefit to LIVEgg’s sexing technology is that it’s efficient. Com-

pared to the PCR method which is limited in the number of eggs per hour, ChickMale Saver can reach about 50,000 eggs per hour.

Their in-ovo sexing technology uses algorithms combined with machine learning methods. Once it identifies whether it’s a male or female egg, it will be exactly like a normal candling machine, says Alon.

“The egg will come, there will be some kind of device that will look at the egg, will check out those parameters using our technology, and analyse it very quickly. We are talking about an analysis that will take about five seconds, and then continue.

“And when it continues, since we know whether it’s male or female, vacuum arms will come and take only the male eggs, and as I said before, either throw them away, or separate between the female and male.”

Such technology has big implications for the industry, not only in terms of driving efficiencies but in terms of animal welfare, as today about 5 billion male chicks are culled at hatch – and that is something big integrators are investing in because they understand animal welfare is not only something that consumers care about, but is just very important to consider.

“Eggs are sexed at about the seventh day,” explains Alon. “We do it earlier than 10 days at least because there is not much development of the embryo, so you can just take out the eggs without harm.”

This technology also benefits the broiler industry, Alon adds, since growing the males and females in different houses appears to be more efficient for the industry and for producers. In fact, the breeders benefit as well, since the males and females need to be sexed and separated, and in-ovo sexing can go a long way to making that process more efficient, he says.

Big data for a big industry

The last product in LIVEgg’s portfolio is that of data solutions and insight. Seeking to share their knowledge, they aim to provide insight by means of a system which uses proprietary algorithms connected to the global industry to help users make better, data-driven decisions based on an understanding of trends in the industry.

If an organisation wants to make money, it will need to be even more efficient, and today, this is the only way to do it. To manage data, to combine all kinds of system together, sort it, analyse it and present it in a way that will really make the management of the operation efficient and to have insights with which one can make decisions.

“We’re developing our data management all the time with many companies. We optimise it and give solutions for all kinds of data management needs.

“This is us.” 



Focus on India

Backyard poultry empowers women and addresses malnutrition in India

Words Basudev Mahapatra

Across India, backyard poultry farming is increasingly offering remote rural families both food and financial support – and as take-up grows, its effects on marginalised groups, especially women, could prove dramatic.

While it's home to malnutrition, poverty and gender disparity, rural India is increasingly becoming a place where people are exploring the possibilities of rearing backyard poultry. Women like Ranjita Sethi, 35, from the eastern Indian state of Odisha, have not only overcome poverty through keeping backyard poultry flocks but have also achieved nutrition security for their families.

Explaining her past, Ranjita, of Dakshin Sahi in Odisha's Puri district says: "We are poor people. When food prices in the market keep rising, we hardly have a choice to buy nutritious food for our children and the family."

After six months of managing country chicken in her backyard, she now has many reasons to smile. "Because I raise the chickens in my backyard, I am in a position now to add egg and meat to our food plates and allow my children grow well with adequate protein intake." Encouraged by the impact they have seen it have on Ranjita and her family,

20 other women from her village have started rearing backyard poultry too. And outside of their village it's a common story: with more and more women opting to raise country chickens as an economic activity, backyard poultry is seeing widespread growth in rural India.

Backyard poultry's place in Indian production

According to the Indian government's [National Action Plan for Egg & Poultry-2022 \(NAPEP\)](#), backyard poultry ac-

counts for 20 percent of India's poultry sector, which is worth over ₹800 billion (around £8.5 billion). Across the country, around 30 million farmers are engaged in backyard poultry, estimates the [19th Livestock Census of India](#).

Backyard poultry farming primarily involves country chicken birds. Today's popular breeds include a number of genetically improved varieties of indigenous low-input technology (LIT) birds such as: Vanaraja, Aseel, Kaveri, Chhabra, Giriraja, Gramapriya, Kuroiler and Rainbow Rooster.



Vanaraja, Aseel, Giriraja in particular are popular varieties preferred by the farmers of major poultry meat and egg producing states like Andhra Pradesh, Tamil Nadu, Maharashtra, West Bengal and Odisha among others.

“These improved country type chickens are efficient dual-purpose birds to cater to both egg and meat needs and fetch more benefit to the backyard poultry farmers,” says said Dr Bandi Kumar Mallick, director of the [Central Poultry Development Organization](#) (CPDO), Bhubaneswar. “They are also resilient to different climatic conditions and capable of protecting themselves from predators.”

LIT birds grow faster than the native chicken, reaching the weight of 1.5kg in 45 days and 2kg in four months (120 days); LIT female birds lay 160 eggs.

Addressing poverty and malnutrition

One of the primary objectives of popularising backyard poultry farming in rural India is to provide better income opportunities to the poor farmers and people from indigenous communities living in remote areas. Among its benefits is that it can help make rural women economically and socially empowered and can address the issues of food inse-

“One of the primary objectives of popularising backyard poultry farming in rural India is to provide better income opportunities to the poor farmers and people from indigenous communities living in remote areas”



curity and malnutrition.

While the whole poultry sector of India produces around 88 billion chickens per year – according to figures for 2016-17, which represented a growth of about 6 percent on the previous year – backyard poultry has a substantial, though still relatively small share in it. Over 31.4 million rural and poor households involved in it produce about 10.6 billion eggs annually, according to figures cited in NAPEP.

Going by standard nutritional requirements, half an egg a day is optimal for an average healthy person, which translates into 180 eggs per person per year. But the present availability is around 69 only.

While India’s per-capita chicken meat consumption is around 3kg per year, compared to the world average of 17kg, the consumption of poultry meat has been very low in rural pockets. The main reason is the low purchasing power of people living in these areas. According to Pragyan Parimita Harichandan, an assistant veterinary surgeon, the popularisation of backyard poultry is essential in India to ensure increasing access to protein and nutritious food at an affordable price in rural India.

In such a scenario, the “scope for backyard poultry is enormous to expand across rural India,” says Mallick.

Government promotion

Under the Department of Animal Husbandry, Dairying and Fisheries (DADF), poultry development programmes are implemented through state authorities.

The national government’s rural backyard poultry development scheme, meanwhile, is a centrally sponsored programme where the government contributes to supplying chicks to farmers who are below the poverty line. In case of north-eastern states, the government provides 100 percent support for this provision.

As per government guidelines, about 25 percent of funds have to be spent on promoting backyard poultry among qualifying groups of farmers, whereas 30 percent of the allocation must be earmarked for women beneficiaries. Under the scheme, state authorities are to ensure adequate health coverage while implementing the programme’s measures.

Each beneficiary gets 45 birds at a subsidised price in two or three cycles



on the basis of progress. If they require more birds, the farmers must invest in them from the income generated out of the business. Each beneficiary is also provided assistance for preparing night shelters and other facilities.

To ensure the benefits reach the maximum number of people, the state government of Tamil Nadu has recently launched a programme for the free distribution of 50 country chicken along with a cage to 77,000 rural women. Andhra Pradesh has implemented similar programmes on a massive scale.

Under several other programmes, the state governments also promote and support backyard poultry in the rural areas for disaster recovery and rehabilitation, entrepreneurship development and livelihood support.

“The government also builds the capacity of farmers by imparting trainings to the farmers on rearing LIT country type chickens,” says Dr Indira Nayak, assistant director at CPDO, Bhubaneswar.

The national government also provides up to 80 percent financial support and encourages entrepreneurs, women groups, non-government as well as gov-

“With support from central as well as state governments, backyard poultry farming is spreading in almost all the states and union territories of India”

ernment agencies to start “Mother Units” to take care of the brooding and vaccination of chicks in the first four weeks of growth before they are distributed.

With support from central as well as state governments, backyard poultry farming is spreading in almost all the states and union territories of India.

Possibilities

Ranjita and her friends are making a profit of ₹3,000 (£32) each every three months while feeding their families with

eggs and meat. Thousands of women in a similar situation across rural India are now empowered through backyard poultry, which has become as an important means of supplementary income. It plays a role in bringing socioeconomic improvement among the more vulnerable sections of society, especially among tribal populations, landless labourers and women in remote areas.

Backyard poultry also makes protein-rich food available to rural people at their backyard or the neighbourhood at relatively low cost. Over the longer term, the hope is that the popularisation of backyard poultry farming will help address poverty, hunger and malnutrition throughout rural India.

According to a report by management consultants McKinsey & Company, as cited in the NAPEP, India’s per-capita chicken consumption is set to grow from 3kg to 9.1kg by 2030, on account of people’s rapidly changing consumption behaviour. This suggests an even greater scope for backyard poultry to grow as an increasingly important part of India’s poultry sector. **PD**



Introducing...

The Kadaknath

Words Ryan Johnson

Native to Madhya Pradesh in India, the Kadaknath is black from beak to bone. Also known by the name Kali Masi or, in Indonesia, Ayam Cemani, it is not only an important food source to many communities, but plays an important role in local traditions and customs..

While the colour of its eggs are white, its legs, skin, feathers, beak and even bones and organs are entirely black due to a genetic anomaly causing

[hyperpigmentation](#).

In India, the roosters reach approximately 2.5kg and the hens between 1.5-2kg. Rather poor setters, they will leave hatching their brood to another hen. They are typically sought after for their meat rather than their eggs, of which only 80 or so are laid per year.

They have been referred to as the "[Lamborghini](#)" of the poultry world, in some regions fetching up to \$5,000 per breeding pair.

They're appearance draws in exotic breed collectors to be sure, but in their native range of Indonesia and India, their mythical meat is said to grant vigour to the consumer and even to cure various ailments.

Owing to their "sacred" properties, they were often sacrificed for good fortune or consumed as medicine, so the breed is under threat of extinction. As a result, the state government started a [Kadaknath breeding programme](#) to re-establish the breed and to help low-income families to earn some income to support themselves.

Outside of India and Indonesia, the breed is quite rare but there are a few breeders still producing them such as [Grade Eh Farms](#) in Canada and [Greenfire Farms](#) in Florida. **PD**

YOUR QUESTIONS

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



Got a question? Email newsdesk@5mpublishing.com | Twitter [@thepoultrysite](https://twitter.com/thepoultrysite) | Facebook [/ThePoultrySite](https://www.facebook.com/ThePoultrySite) | Forum forum.thepoultrysite.com | Post Unit 10, Southill Business Park, Cornbury Park, Charlbury, Oxford, OX7 3EW

Q: What's the safest way to use poultry manure as fertiliser?

A: As a fertiliser, poultry manure has been debated over for decades with many saying it is "too strong" to use. Certainly, all fresh manures and especially avian manure is high in nitrogen compounds and tends to be alkaline with a pH of up to 9.0. Foliage coming in contact with this combination will scorch and soil pH will temporarily rise, again causing problems for plants and beneficial soil organisms. Fresh poultry manure may also contain unwelcome bacteria and intestinal parasites, some of which, such as blackhead, rely on soil bound hosts to complete their life cycle. Two things must be considered when using the manure. Firstly, is it free from pathogens? Secondly, what concentration should be used?

The safest way to compost manure is aerobically, this can be done in a tumbler or a regularly turned compost heap. The important ingredient being high temperatures which will kill most of the unhealthy organisms. The only way of being certain about dilution rates for the composted material would be a chemical analysis and then diluting to suit your needs, this is because you are dealing with a highly variable material. You will find cheap test kits on the

internet. One thing you will need to be aware of, less so if you are using organic poultry feed, is the build-up of heavy metal residue, so all animal manures should be used sparingly and preferably mixed with a lot of vegetable matter

Q: I'd like to use a covered sand box as a dust bath for my chickens. What substrate would be best to use? I've heard Diatomaceous Earth and Pyrethrum dust are good. What about wood ash or play sand?

A: Chickens are habitual dust bathers and will use your flowerbeds if nothing else is available, but even amongst the petunias, it's a delight to watch. I simply would not bother with any form of ash, unless you have a bonfire and then only if you know what's been put on it. The risk of toxins in ash is very high and the particle size is so small it could easily cause respiratory problems. Diatomaceous Earth with a dose of Pyrethrum dust are an excellent ingredient for any dust bath. The DE acts as a natural scrubber, lacerating the skins of lice, fleas and mites; pyrethrum dust has been used consistently as a mild insecticide for decades and although

not as effective as sophisticated topical ointments such as "spot on" will increase the effectiveness of the dust bath overall.

Also, unlike a lot of medications both DE and Pyrethrum don't require you to stop eating your chickens' eggs. DE is now recognised as an effective treatment for intestinal parasites when ingested. You can bulk up the dust bath with soil or sand, the key being that it is very dry and free flowing. Chickens don't appear to need much encouragement to dust bath and any old bowl, box or depression will suffice. The ingredients of a dust bath will remain effective for months, so I would be inclined to refresh the contents if they are soiled with faeces or get damp, otherwise a change once of a month should be more than adequate. **PD**

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

MAY

South West Chicken Association (SWCA)

Date: 14 May 2019

Location: Congresbury, UK

The SWCA will bring in experienced speakers to discuss what it takes to produce high quality poultry in the current economic and political climate. It is a free conference open to all who are associated with the industry, as well as their guests.

www.poultryconference.com/SWCA/

Panafrican Poultry Conference (PPC)

Date: 13-17 May 2019

Location: Lome, Togo

Several poultry experts, researchers, scientists and industry from different parts of the world are attend this conference, which aims to address the challenges of the poultry industry in Africa.

www.wpsa.com/index.php/47-news-latest/news-wpsa/318-pan-african-poultry-congress-ppc

IFFA

Date: 4-9 May 2019

Location: Messe Frankfurt, Germany

The internationally renowned IFFA in Frankfurt am Main aims to provide networking opportunities for professionals in the industry, retail trade and butcher's trade sectors of meat production.

iffa.messefrankfurt.com/frankfurt/en.html

JUNE

VIV Turkey

Date: 13-15 June 2019

Location: Istanbul, Turkey

VIV Turkey represents every part of the meat production process and aims to



ISTANBUL, TURKEY | VIV Turkey will be held in Istanbul, Turkey from June 13-15, 2019

facilitate the transfer of knowledge and technology between Turkish poultry sector professionals by creating an international platform that will foster development for all.

www.vivturkey.com/

European Symposium on Poultry Nutrition

Date: 10-13 June 2019

Location: Gdansk, Poland

These highly regarded symposiums are known for their role in facilitating the exchange of knowledge and information on poultry nutrition challenges in Europe. This year's ESPN provides attendees with the opportunity to present scientific and technical achievements in poultry nutrition how to put them into practice.

www.wpsa.com/index.php/calendar-home/calendar/25-20th-european-symposium-on-poultry-nutrition

VICTAM International

Date: 12-14 June 2019

Location: KoelnMesse, Cologne

The exhibition is a "one stop" show for the decision-makers in the livestock industry. The event also focuses on a series of high quality industry conferences and business matchmaking events with colleagues and clients.

victaminternational.com

European Symposium on the Quality of Poultry Meat

Date: 23-26 June 2019

Location: Izmir, Turkey

This symposium will provide a platform for the exchange of new ideas, information on the subject of poultry meat quality and for building and strengthening professional relationships.

www.eggmeat2019.com

PAG Asia

Date: 6-8 June 2019

Location: Futian shangri-la, Shenzhen, China

PAG ASIA 2019 in Shenzhen, China features some of the best minds in the ag-genomics industry to share the latest information and scientific breakthroughs.

www.intlpagasia.org/2019/index.php/en/

Livestock Philippines Expo

Date: 26-28 June 2019

Location: Manila, Pasay City, Philippines

The Livestock Philippines Expo is the Philippines premier event for the livestock, feed milling and meat industries.

www.intlpagasia.org/2019/index.php/en/



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