

Far Eastern Agriculture

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against viral infection

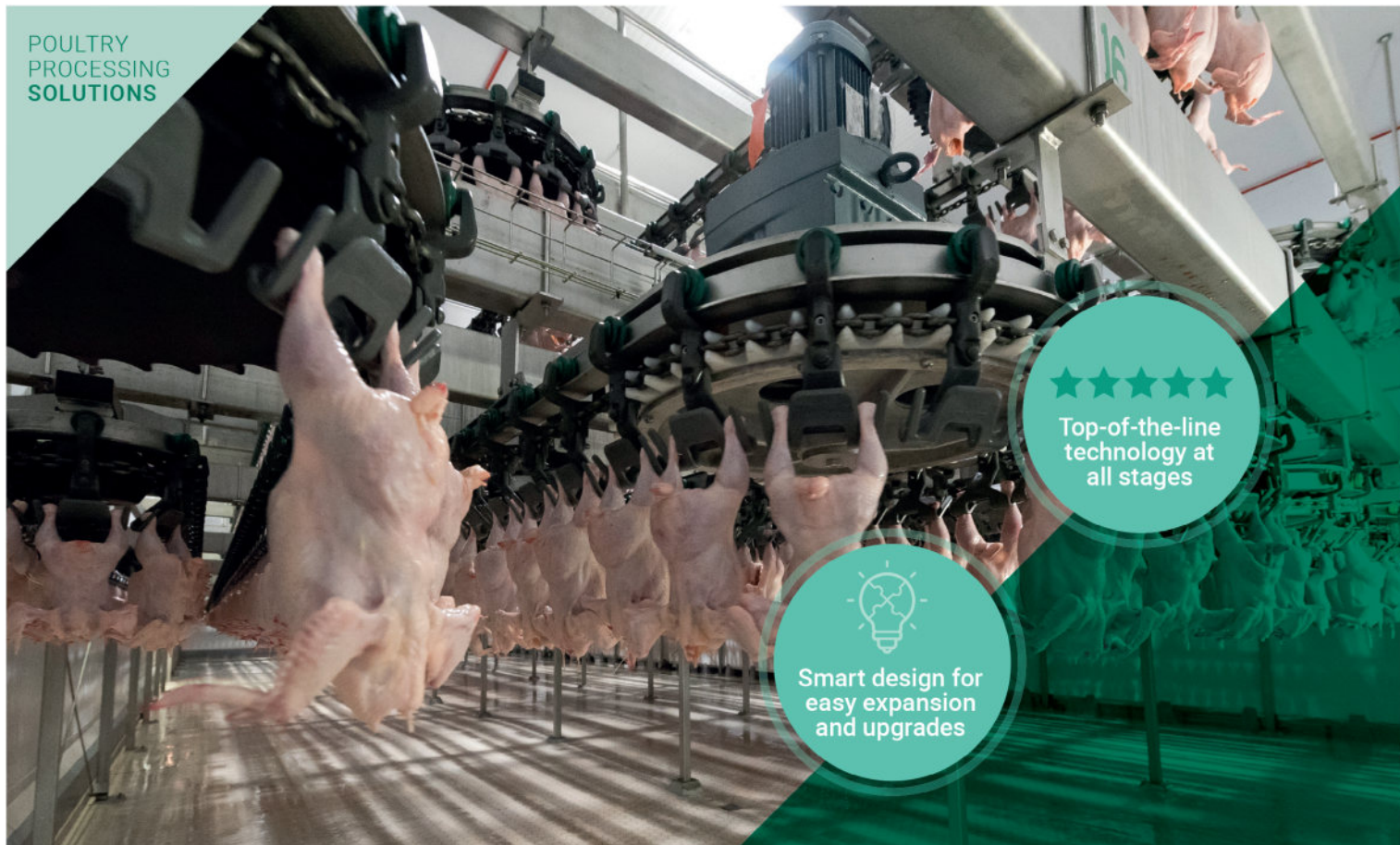
Livestock:
Ensuring hygiene in the houses

Crops:
Realising trends in oil palm expansion



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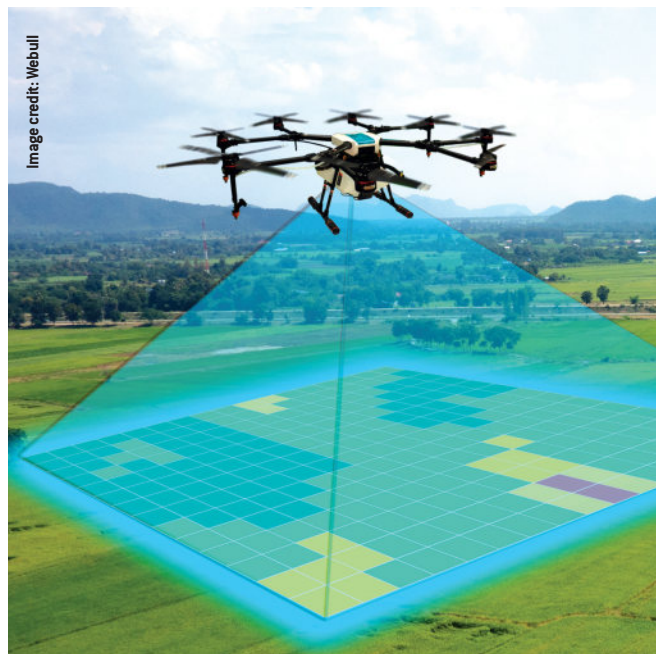
Qingdao Webull promotes online farming

QINGDAO WEBULL INTELLIGENT Technology is promoting 'online farming' by unmanned agricultural robots with an aim to increase farmer's income and get intelligent solutions for efficient and intelligent agricultural production. Foreign media journalists also visited Qingdao Webull Intelligent Technology to witness 'online farming' conducted by unmanned agricultural robots.

Webull believes the intelligent agriculture relies on the trinity solution of "agriculture cloud platform + driverless vehicle + work robot."

Webull Intelligent Technology is engaged in the research and development of unmanned agricultural robots. Through the cloud platform, it can give instructions to the unmanned vehicles in the field remotely, and can carry out unmanned management of the whole process of farmland, such as spraying, weeding and picking, to replace 70% of the manual work. It can also collect data in real time to provide accurate data support for all aspects of agricultural production.

Webull developed the picking robot which is equipped with modules such as robot perception, motion control, planning and interaction. It receives and processes information through the central computing unit, microcomputer control module, sensor module, etc. At present, it can complete within 0.2s within one sq m. The single-handed picking speed is eight seconds/piece, and the recovery rate is close to 80%.



Webull Intelligent Technology is engaged in the research and development of unmanned agricultural robots.

Evonik proves ecological advantages of its feeding solutions

A COMPARATIVE LIFE cycle assessment (LCA) by Evonik has further demonstrated the ecological advantages of using its feed amino acids and feeding concepts compared with common animal nutrition practices.

The global LCA analysed the environmental impact of feeding swine, broiler chickens, and laying hens. The study was audited and certified by TÜV Rheinland according to ISO 14040 and 14044 in the Q2 2021.

"Our system solution – based on a balanced amino acid profile, low crude protein content, and our amino acid products – can contribute significantly



The Animal Nutrition business line is part of Evonik's life sciences division Nutrition and Care.

to reducing the environmental footprint of livestock farming, without compromising animal welfare," said Dr Emmanuel Auer, head of Evonik's Animal Nutrition business line. "And we need to use this scope to meet the animal protein needs of a growing world population without overstressing natural resources."

The Animal Nutrition business line is part of Evonik's life sciences division Nutrition and Care, which is all about developing sustainable solutions for a better life for people and animals. "It is impossible to meet the challenges of our times with single products. This is why we concentrate all our knowledge and experience on developing targeted system solutions," Auer added.

"Today, amino acid supplementation is common practice in many parts of the world," said Dr Jan-Olaf Barth, head of the Efficient Nutrition product line at Evonik. That was taken into account in the current study, as were regional differences in feed composition. "This enables us to provide our customers with even more targeted advice," said Barth.

Aleph Farms completes US\$105mn Series B funding round

ALEPH FARMS, THE cultivated meat company growing steaks directly from non-genetically modified animal cells, has announced the completion of a US\$105mn Series B funding round.

The funding round was led by the Growth Fund of L Catterton, global consumer-focused private equity firm, and DisruptAD, one of the largest venture platforms in the Middle East. It also saw participation from Skyviews Life Science, as well as a consortium of leading global food and meat companies including Thai Union, BRF, and CJ CheilJedang. Additionally, existing investors, including VisVires New Protein, Strauss Group, Cargill, Peregrine Ventures, and CPT Capital, participated in the Series B funding round. To date, the company has raised more than US\$118mn.

Michael Farello, a managing partner at L Catterton's Growth Fund, said, "With cultivated whole-muscle cut steaks, an optimised platform for cost parity at scale, and a global partnership network with the world's largest meat producers, Aleph Farms has differentiated itself as the leading cultivated meat company poised to go to market."



The company will use the funds to execute its plans for large scale global commercialisation of cultivated beef steaks and portfolio expansion.

Taiwan encourages egg producers to invest in cage-free systems



Image credit: Adobe Stock

The revisions to the official guidelines will affect around 10% of Taiwan's 40 million laying hens.

TAIWAN HAS REVISED its official guidelines for laying hen welfare for the first time since they were introduced in 2015. The changes deliver substantial animal welfare improvements for laying hens raised in free range and barn systems, as well as those kept in enriched cages, and were made following formal representations by the Environment & Animal Society of Taiwan (EAST).

The guidelines have legal effect, making them mandatory for any eggs labelled with the terms 'free range', 'barn', or 'enriched cage'. The upgrade comes soon after authorities announced a reduction in interest rates for farmers investing in cage-free systems as a part of the government's low-interest loan scheme.

The most significant change introduced by the guidelines is an increase in the amount of space cage-free farms should provide for each hen. Free range and barn systems must provide at least one square metre of space per 10 birds, up from one square metre per 12 birds.

The updated guidelines also ban the practice of forced moulting (which sees hens deprived of food for up to two weeks to stimulate egg production), specify nest box materials, perch design, and range of shelter size, and require farms to provide segregated areas for sick or injured hens.

"The updated regulations are a vote of confidence in Taiwan's cage-free transition," explained Yu-Min Chen, deputy chief executive of EAST, praising the authorities

for responding to growing consumer concern for farmed animal welfare.

The guidelines raise significant requirements for enriched cage facilities, and encourage producers to invest in cage-free systems. In addition to an existing requirement to provide at least 750 sq cm of space per bird, enriched cages will now need to provide at least 600 sq cm of useable space per bird (nesting areas cannot be counted as 'useable space'). The cage height is required to be 45cm throughout the entire cage, and there are new requirements to ensure sufficient access to feeders and drinkers.

While EAST has long advocated for the removal of enriched cages from the scheme, the changes close loopholes in Taiwan's requirements for enriched cages, which fell far below EU standards in the past.

Taiwan's cage-free movement is rapidly gaining ground. In late 2020, furniture giant IKEA committed to go 100% cage-free in its Taiwanese restaurants by the end of this year. In April, luxury hotel group LDC Hotels & Resorts debuted a series of Mother's Day cakes made using exclusively cage-free eggs. In May, Taiwan's largest retailer PX Mart unveiled designated cage-free zones in 600 of its supermarkets across Taiwan. The revisions to the official guidelines are expected to affect around 10% of Taiwan's 40 million laying hens.

For more on cage-free systems, turn to our interview story with Global Food Partner on page 10.

EVENTS 2021 - 2022

NOVEMBER

2-3

Sugarex Thailand

Khonkaen, Thailand

www.thaisugarexpo.com

11-13

Livestock Philippines

Pasay City, Philippines

www.livestockphilippines.com

SEPTEMBER

21

Meeting on Forest Certification standard for smallholders

Virtual, Bangkok, Thailand

www.fao.org/asiapacific/events/en

DECEMBER

9-11

10th Agri Asia

Gujarat, India

www.agriasia.in

JANUARY 2022

12-14

VICTAM and Animal Health and Nutrition Asia

Bangkok, Thailand

<https://victamasiam.com/?v=1>

February 2022

27 February-5 March

Agritechnica

Hanover, Germany

www.agritechnica.com/en

May 2022

25-27

Agritechnica Asia and Horti Asia

Bangkok, Thailand

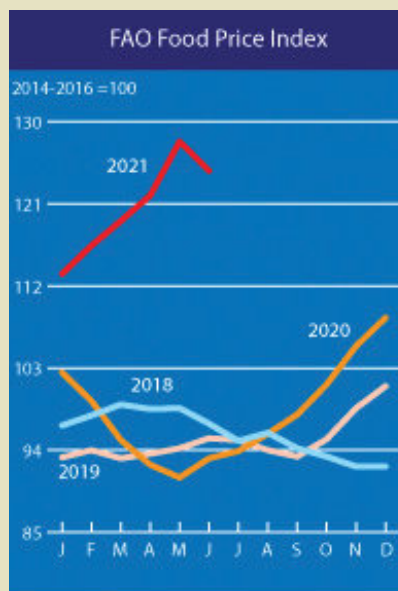
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FOOD OUTLOOK

THE FAO FOOD Price Index (FFPI) averaged 124.6 points in June 2021, down 2.5% from May, but still 33.9% higher than its level in the same period last year. The decline in June marked the first drop in the FFPI following twelve consecutive monthly increases.

The FAO Cereal Price Index averaged 129.4 points in June, 2.6% from May but still 33.8% above its June 2020 value. After reaching their highest level in May since January 2013, international maize prices dropped by 5% in June, yet remained over 72% higher than in the same period last year.

The FAO Vegetable Oil Price Index averaged 157.5 points in June, falling by 9.8% from May and marking a four-month low. The sizeable month-on-month drop mainly reflects lower prices of palm, soy and sunflower oils. After rising for 12 consecutive months, international palm oil quotations retreated in June, chiefly influenced by prospective seasonal production gains in leading producing countries and a lack of fresh import



demand. Meanwhile, subdued global import demand also exerted downward pressure on soy and sunflower oil prices.

The FAO Dairy Price Index averaged 119.9 points in June, down 1% from

May, ending twelve months of uninterrupted increases. At this level, the index value stood 22% above its value in the corresponding month last year. In June, international quotations for all dairy products represented in the index fell, with butter registering the highest drop, underpinned by a fast decline in global import demand and a slight increase in inventories, especially in Europe.

The FAO Meat Price Index averaged 109.6 points in June, up 2.1% from its revised value for May, continuing the increases for the ninth consecutive month and placing the index 15.6% above the corresponding month last year, but still 8% below its peak reached in August 2014.

The FAO Sugar Price Index averaged 107.7 points in June, up slightly by 0.9% from May, marking the third consecutive monthly increase and reaching a new multi-year high. The recent increase in crude oil prices and an appreciation of the Brazilian Real against the US dollar in June lent additional support to world sugar quotations.

Israeli tech helping Southeast Asian farmers

ISRAEL'S AGRICULTURE TECHNOLOGY companies are seeking business opportunities in Southeast Asia, as countries such as Thailand, Vietnam and the Philippines look to the Middle East to boost food production.



Vietnamese workers will be sent to Israel to gain experience in the country's agricultural sector.

Agricultural technologies in Israel are exploring business potential in the region, with Israel's irrigation and sprinkler systems finding way for more sustainable agricultural production.

For example, Vietnam is working closely with Israel and under the terms of an agreement, Vietnamese workers will gain experience from Israel's booming agricultural sector. With Israeli-enabled greenhouses in Vinh Phuc, Vietnamese farmers have successfully cultivated crops using hydroponic techniques.

Israeli technologies are set to help Southeast Asia to fight food security threats due to climate change and supply disruptions due to the pandemic.

Thai CP acquires Russian livestock farms

THAILAND'S CHAROEN POKPHAND Group has spent US\$13mn for Charoen Pokphand Foods (CPF), to acquire Russian pig farms and build up international livestock businesses.

The acquisition took place via the purchase of 100% of Russia's BiltOil and its food and agricultural subsidiary.

With the funds, CPF aims to raise around 2,600 sows and produce around 63,000 fattening pigs per year in Russia, while also producing around 13,000 tonnes of grain yearly, as reported by Nikkei Asia.

The acquisition aims to help CPF expand its business in Russia as well as boost its poultry and livestock sales in



With the acquired funds, CPF has the capacity to raise around 2,600 sows and produce around 63,000 fattening pigs per year in Russia.

neighbouring countries.

In a statement, Thai CP stated, "The transaction will provide the opportunity for CPF to expand its swine business in line with its strategy to produce fattening pigs in Russia. Also, CPF will be able to increase the utilisation of its feed mill in Russia."

Nam Huong launches Vietnam's first commercial cage-free barn

VIETNAM HAS JOINED other Southeast Asian countries in the movement to promote cage-free eggs with the opening of the country's first cage-free barn with technical support from Humane Society International.

Nam Huong is an established mid-scale egg producer in Tien Giang, with current capacity of 700,000 laying hens, producing around 200 million battery cage eggs per year. The transition to cage-free requires investment and specialised management, and with technical support from Humane Society International, Nam Huong is converting two original battery cage houses to cage-free. This initial project will help to free 3,000 laying-hens in the first year.

Le Van Hoa, director of Nam Huong, commented, "Vietnam is one of the fast-growing economic countries in the region. I have seen the cage-free egg movement



Nam Huong is converting two original battery cage houses to cage-free.

growing in our neighbouring countries, such as Thailand and Malaysia. Consumers' concern regarding animal welfare is increasing and I am expecting Nam Huong would be one of the first producers in Vietnam to make the switch to cage-free housing."

Hang Le, farm animal welfare manager, HSI in Vietnam, stated, "With the

movement from producers, like Nam Huong, HSI urges individual consumers and the food industry to consider farm animal welfare when buying or sourcing eggs. By supporting cage-free producers, consumers can drive Vietnam's egg production industry towards a more humane way of farming."

HSI is helping buyers and producers to transition to cage-free egg production in many ways, such as hosting events for a range of stakeholders, from technical workshops for producers to companies that are changing their supply chain throughout Southeast Asia.

To improve the living conditions of laying hens in Vietnam, Nam Huong and HSI will work together in the upcoming years to plan and convert additional battery cages to cage-free for tens of thousands of hens.

Phytogenic solution launched

EW NUTRITION, AN international player in the animal nutrition industry, has revealed Grippozon as its respiratory health solution in the Philippines.

Grippozon, already successful in various international markets, prevents and mitigates respiratory challenges in farm animals and reduces the possibility of viral challenges from developing into bacterial pneumonia.

In a webinar, Dr Merideth Parke offered a global perspective on swine respiratory diseases and highlighted the factors impacting the cost to production systems.

With vast experience working in farms in southeast Asia, guest speaker Art Frio provided insights into the implementation of innovative solutions tackling respiratory challenges in farm operations.

Dr Ruturaj Patil then introduced the features and benefits of Grippozon and also shared feedback from global customers with the attendees. He highlighted Grippozon's contribution to speeding up recovery from respiratory symptoms, improving appetite by creating optimal breathing conditions, and stimulating water and feed intake.

The webinar was rounded off with an interactive Q&A session, where the audience had the opportunity to have their questions answered live by the panel of speakers.

Jurek Grapentin, regional director of EW Nutrition South East Asia/Pacific, said, "We are always working with our valued partners to understand the needs and challenges of the industry. Acting preventively against respiratory risks, Grippozon can improve welfare and respiratory ease, reduce the need for antibiotics, and consequently mitigate the risk of antimicrobial resistance. Our experiences also show economic benefits for the producers implementing ABR strategies in their production."

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Indonesia preparing post-COVID-19 cultivation fields



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As major agricultural events have shifted to 2022, Indonesia is one step ahead in accelerating the country's agribusiness value chain in a post-pandemic world.

THE INDONESIAN GOVERNMENT intends to increase national production of local agricultural machinery and has set aside US\$538mn for machinery development. According to Ken Research's Indonesia Agriculture Equipment Market Outlook to 2025, the government plans to invest in rice R&D and science to further improve yields on available favourable land, while expanding rice production to frontier areas, where the rice plant must withstand harsher environments. Indonesian farmers are likely to increase the usage of disc ploughs on farms over the long term.

The agricultural sector currently accounts for 14% of the nation's GDP in accordance with Indonesia's statistical department. The proportion is anticipated to increase in the future due to higher demand for agricultural equipment, including 2W and 4W tractors.

COVID-19 impact on Indonesia agriculture equipment market

Restrictions were put in place thereby, causing delay in the harvesting of major staple crops, such as rice, and farming

operations. Due to the COVID-19 outbreak, the companies are now focusing on new strategies of assembling and producing machinery locally. Lowering trade barriers can also aid the country to diversify import sources to hedge the trade risks from other countries.

The market is expected to register a positive six-year CAGR of 6.1% and 5.7% in terms of sales value and volume, respectively, during the forecast period 2020-2025. The tractors and combine harvesters markets and rice transplanters and implements markets in Indonesia is further expected to grow at a revenue CAGR of 6%, 7.5%, 4.7% and 3.8% respectively, and at a volume CAGR of 5.6%, 7.5% and 4.7% respectively, during the forecast period 2020-2025.

For all the events, health and well-being of the participants and attendees is the utmost priority."

Events lined up for 2022

The eighth Inagritech will be held from 24-26 August 2022 at the JIExpo in Kemayoran, Jakarta. The event will continue to be the ideal platform for major industry players for local as well as international companies to explore their business opportunities, unveil innovations, and showcase their latest technologies and products to the larger marketplace and engage in more business networks.

The fourth SugarMach Indonesia 2021 will also take place from 24-26 August 2022 at JIExpo Kemayoran, Jakarta and co-locate with INAGRITTECH, INAGRICHEM, INAPALM ASIA. The show will feature a new section: Pump and Valve Indonesia 2022 – for the pump and valve system industry, and Tube and Pipe Indonesia 2022 for the tube and pipe industry as well as INAHARDWARE 2022 for hardware, tools and materials (agriculture, garden and work tools).

In addition to this, SugarMach Indonesia has gained strong support from the Indonesian Sugar Association (AGI) and Indonesian Association of Sugarcane Technologist (IKAGI). SugarMach Indonesia 2022 is being held in an attempt to push Indonesia's infrastructure development in the sugar industry as well as supporting the country's effort to achieve sugar self-sufficiency in 2020. ■

Genes in chicken linked to food bug

RESEARCH HAS IDENTIFIED genes in chickens that could offer resistance to harmful bacteria, commonly found in poultry and could inform ways to limit the risk of associated food poisoning in people.

The study, led by a team from the Roslin Institute, has identified a large number of genes in chicken guts that may determine whether the birds are resistant to *Campylobacter*. The insights could inform research towards breeding chickens that are less likely to carry *Campylobacter* bacteria, and so limit the risk to poultry consumers.

Scientists tested the effects of *Campylobacter* infection on chickens that were bred to be resistant or susceptible to the bacteria. Analysis of gut tissue showed differences in activity of a large number of genes, including some involved in

immunity, such as the so-called Major Histocompatibility Complex and antimicrobial peptides.

The variation between these genes in susceptible and resistant chickens may partly explain their response to *Campylobacter*. These findings, published in BMC Genomics, reinforce previous research by the same team.

An earlier study, published in Applied and Environmental Microbiology, had investigated the role of microorganisms in the chicken gut in susceptibility to infection. The team found that transplanting gut microbes from chickens that were resistant to *Campylobacter* into chickens that were susceptible did not enable resistance to infection.

Another study, published in Scientific Reports, has identified regions in the

genetic makeup of chickens that are linked to resistance to *Campylobacter*. Scientists looked for variation at specific positions in the chickens' genome and corresponding numbers of *Campylobacter* in the gut of the birds.

They combined this with analyses of the expression of genes in chickens that were resistant or susceptible to colonisation by the bacteria. Results informed the extent to which parts of the chickens' genetic code can be linked to the prevalence of *Campylobacter* in the birds' gut.

The latest findings further validate the outcome of another study, also published in BMC Genomics, which analysed the genetic code of chickens to identify areas linked to birds' susceptibility or resistance to *Campylobacter*. Genes highlighted in this study included the Major Histocompatibility Complex. ■



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Embracing cage-free eggs in Asia

Dr Kate Hartcher, a senior animal scientist at Global Food Partners (GFP), explains the importance of training and management in cage-free egg production.

What are cage-free eggs? What are the advantages of cage-free production, in terms of quality?

Cage-free eggs come from hens that are not housed in cages, including conventional, or furnished cages. In Asia, most commercial laying hens are housed in conventional cages, although a growing number of producers in the region are using cage-free production facilities.

There are many advantages to cage-free egg production. In cage-free systems, the hens are not kept in cages and are able to move freely throughout the housing facility. Well-designed and managed cage-free systems allow hens to perform their natural behaviours including perching, dustbathing, foraging, and laying their eggs in nests.

Cage-free production can also provide increased market opportunities for egg producers. We are seeing a growing demand for higher animal welfare products, and more and more food businesses are now committing to source exclusively cage-free eggs. In Asia, many food and hospitality businesses have pledged to only source cage-free eggs in their supply chains, including Nestle, Hyatt, Compass Group, Minor Hotels and Foods and Unilever.

When was Global Food Partners founded and what are its main industries?

Global Food Partners was founded in 2019 to help businesses, particularly those involved in the cage-free egg supply chain, navigate this complex supply chain, meet their responsible sourcing commitments, and improve both profitability and sustainability.

We are uniquely positioned to work with both sides of the supply chains – buyers from the food industry – including food manufacturers, restaurant groups, food service companies and hospitality brands – and directly with egg producers and suppliers, to help develop and implement good cage-free sourcing and production practices.

Shifting to cage-free production requires revised health and management plans. How can producers achieve this?



Dr Kate Hartcher, senior animal scientist at Global Food Partners.

Robust health and management plans, including good biosecurity, are required for all housing systems, not just cage-free. However, there is an increased need to understand bird health and behaviour in cage-free systems – producers need to be able to identify normal and abnormal appearance and behaviour of hens. For example, severe feather pecking and infectious diseases can cause poor animal welfare, high rates of mortality, and economic losses. Producers need to be able to identify early signs of these issues to effectively manage the situation and prevent their spread.

To support producers, we will be launching training videos for cage-free egg producers – ‘Cage-free egg production: The basics’. The course will include educational modules on a variety of topics including biosecurity, flock health management, and severe feather pecking.

What are the tools and initiatives needed to strengthen cage-free egg production?

In Asia, we are seeing that egg producers need localised, technical support to transition to cage-free egg production; establishing and maintaining successful cage-free egg farms is more than just a simple process of removing cages. Global Food Partners understands the complexity of this topic and work with producers to

help identify and overcome the unique challenges they face.

To provide relevant support, we have conducted a large multinational research project spanning six countries across Asia. With expert country collaborators at seven universities and engagement with the egg industry in each respective country, we conducted an assessment to determine the most important needs identified by producers themselves. We included cage and cage-free egg producers alike, on the transition to and maintenance of cage-free farms. The results from this project will be made available shortly.

Good staff training is critical for animal welfare, farm viability, and staff satisfaction in all livestock industries. We provide virtual and on-the-ground training to producers across Asia. This training helps producers to plan, as well as identify and mitigate issues on farm. In addition to this, we are working with industry leaders to establish cage-free training centres and model farms in Indonesia and China. The centres will bring together industry stakeholders to form an industry consortium, showcase cage-free equipment and management tools, and provide practical training in best practice cage-free management and production. This month, we announced our partnership with Aeres University of Applied Sciences and the Faculty of Animal Science of Indonesia's Universitas Gadjah Mada to develop the first cage-free training centre. This centre will be the first of its kind in Asia.

Tell us a bit more about the IMPACT partnership programme. How many trainings have you conducted?

We have partnered with the Impact Alliance to help companies fulfill their cage-free commitments, support cage-free farmers and accelerate cage-free egg production in Asia. The Impact Alliance brings together leading sustainability standard owners and organisations. Producers who meet an approved cage-free benchmark are awarded certificates, or ‘Impact Incentives’.

Producers can then register and sell these certificates on the Impact Alliance cage-free egg platform.

Impact Incentives offer a market mechanism that helps food businesses meet their cage-free egg commitments, accelerate the production of cage-free eggs, and provide financial incentives to producers who meet heightened animal welfare standards.

Through Impact Partnerships, food businesses directly support the training and infrastructure of their egg producers to transition to cage-free production systems. Global Food Partners delivers training to farmers, connects farmers with credible third-party auditors, and works with food business to create and communicate their “impact story”. Within three years of the Impact Partnership, GFP intends to build the capacity of cage-free egg farmers, enabling them to either trade Incentives or directly supply the food businesses with physical cage-free eggs.

GFP has conducted several virtual and in-person, on-farm training sessions with

cage-free producers in Asia, offering assistance in establishing their rearing and laying facilities, as well as providing training videos virtually and in-person. We have also developed cage-free producer guidelines and benchmarking.

How have cage-free trainings fared so far in Asia?

Producers have been receptive to our training and have provided positive feedback regarding our advice and technical presentations. 18,000 live viewers attended both of our ‘setting up a cage-free farm’ webinars in China, illustrating tremendous interest in the topic in the region.

An example of a successful producer partnership and training includes our collaboration with PingYao Weihai Ecological Agriculture in PingYao, China to support the establishment and ongoing operations of its new cage-free egg rearing and layer hen facilities. The collaboration involves capacity building of farm staff in cage-free management and bird health and

welfare; our technical experts have provided support through on-farm and virtual consultations to train farm management and staff.

Tell us about your recent projects?

We are excited about our partnership with Aeres University of Applied Sciences and the Universitas Gadjah Mada. The centre we are establishing there will bring together egg producers and other industry stakeholders, to improve the long-term sustainability and competitiveness of the cage-free egg industry, in Indonesia and across Asia.

The centre will provide practical training in best practices in cage-free management and production, serve as a model farm for cage-free producers, and as a research and development centre. The Faculty of Animal Science at Universitas Gadjah Mada will host and operate the training centre, while we will provide ongoing support from our team of in-house experts and industry consortium. ■

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The right house to live in



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Animals should be housed with a goal of maximising species-specific behaviours and minimising stress-induced behaviours.

The environment in which animals are maintained should be appropriate to the species, its life history, and its intended use.

A GOOD MANAGEMENT PROGRAMME provides the environment, housing and care that permit animals to grow, mature, reproduce and maintain good health; provides for their well-being; and minimises variations that can affect research results. Specific operating practices depend on many factors that are peculiar to individual institutions and situations. Well-trained and motivated personnel can often ensure high-quality animal care, even in institutions with less than optimal physical plants or equipment.

As mentioned in the National Academies of Sciences, Engineering, and Medicine, animals should be housed with a goal of maximising species-specific behaviours and minimising stress-induced behaviours.

A strategy for achieving desired housing should be developed by animal care personnel with review and approval by the IACUC. Decisions by the IACUC in consultation with the investigator and veterinarian, should be aimed at achieving high standards for professional and husbandry practices considered appropriate for the health and well-being of the species and consistent with the research objectives. After the decision-making process, objective assessments should be made to substantiate the adequacy of animal environment, husbandry and management.

Microenvironment and Macroenvironment

According to the source, “The

Well-trained and motivated personnel can often ensure high-quality animal care.”

microenvironment of an animal is the physical environment immediately surrounding it – the primary enclosure with its own temperature, humidity, and gaseous and particulate composition of the air. The physical environment of the secondary enclosure – such as a room, a barn, or an outdoor habitat – constitutes the macro environment.

“Although the microenvironment and the macro environment are linked by ventilation between the primary and secondary enclosures, the environment in the primary enclosure can be quite different from the environment in the secondary enclosure and is affected by the design of both enclosures.”

The source further stated that the measurement of the characteristics of the microenvironment can be difficult in small primary enclosures. Available data indicates that temperature, humidity and concentrations of gases and particulate matter are often higher in an animal's microenvironment than in the macroenvironment. ■

IIASA's satellite imagery map reveals trends in oil palm expansion

THE EVER GROWING demand of palm oil and its multifarious use (in beauty products, food, industrial processes and as a fuel) has caused oil palm production to more than double in the last two decades; a development that has deeply impacted natural forest ecosystems and biodiversity, and has significantly contributed to climate change by releasing carbon from converted forests and peatlands into the atmosphere.

Today, almost 90% of the world's oil palm production takes place in Southeast Asia. But the yields vary dynamically with plantation stand age, management practices and location. To understand trends in oil palm plantation expansion, and for landscape-level planning, accurate maps are needed.

IIASA researchers provided a detailed map of oil palm extent in 2017, using Sentinel 1 satellite imagery from the European Space Agency, in a new paper titled "A map of the extent and year of detection of oil palm plantations in Indonesia, Malaysia and Thailand" published in the Nature Scientific Data journal.

"We specifically wanted to determine the extent and age of oil palm plantations across Southeast Asia and see if we could use technologies such as Google Earth Engine and data mining algorithms to produce an accurate map of oil palm extent from Sentinel 1 radar data, which could potentially be operationalised into a near-real time oil palm detection system. In addition, we wanted to explore the possibility of using time series analysis to go backwards in time and determine the age at



Image credit: Adobe Stock

Today, almost 90% of the world's oil palm production takes place in Southeast Asia.

which the plantation can first be detected (when trees are around two to three years in age)," explained lead author Olga Danylo, a researcher with the IIASA Novel Data Ecosystems for Sustainability Research Group.

While oil palm extent has been mapped before, this paper uses Sentinel 1 satellite data in combination with other data sets to map extent, along with time series from the Landsat archive to derive the year of plantation detection (which is a proxy for productive age of the plantations). The paper's major output is a 30-metre resolution map of Southeast Asia that

indicates if oil palm is present, and the year of detection of the plantation. The oil palm extent map has an overall accuracy of 83%, which is comparable to other products.

The largest area of oil palm can be found in Sumatra and Kalimantan, with expansions in all major regions since the year 2000. The map shows that the largest relative expansions over the last decade have taken place in Kalimantan, insular Malaysia and Thailand, but interestingly, the net oil palm plantation area, excluding milling facilities, roads and other related infrastructure.

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AGRICULTURAL VENTILATION SINCE 1996

Indoor disinfection using hot and cold fogging

Indoor disinfection presents a wide spectrum of situations of different size and shape.
Dr Terry Mabbett reports.



Swingfog SN50 in action at a university in Thailand

Image Credit: Swingtec GmbH

EASE AND SPEED of spread of respiratory diseases from person to person indoors was already well-established in the public health arena, but the on-going worldwide Covid-19 pandemic has put this danger under the spotlight. Corresponding requirements for regular, complete disinfection of indoor situations is equally well appreciated. Effective treatment requires complete disinfection in both space (volume) and surface area. This can only be achieved by harnessing a spectrum of droplet sizes, including small aerosol droplets which 'hang' in the air for space disinfection, and larger droplets which settle out to disinfect horizontal and vertical surfaces.

Indoor disinfection against viral infection

A succession of influenza A viruses (H5N1 bird flu virus and H1N1 swine flu virus) causing zoonotic diseases which can be transmitted to humans, and corona type viruses (SARS and MERS) originating in animals, have raised the profile of indoor disinfection. And nowhere more so than in Asia and the Middle East where the full effect of these virus diseases was previously felt. However, the Coronavirus (Covid-19) pandemic has alerted and focussed minds worldwide on the crucial importance of indoor disinfection, including hospitals, offices, shops, factories and all modes of mass transit and transport – aeroplanes, ships, trains, trams, metros and buses.

Indoor disinfection presents a wide spectrum of situations of different size and shape, and therefore volume (space) and surface area comprising walls, floors and ceilings as well as fittings, fixtures and equipment, some of which will be movable and some not. Frequency of disinfection will be governed in part by the turnover of people entering and leaving the enclosed space. Promptness and speed of application is another important consideration in areas such as railway stations and airports with rapid throughput of commuters and travellers.

Next consideration is safety of the delivery system or formulation and the carrier liquid used to disperse the disinfectant chemical. Some applicators

must use oils or solvents to achieve the required droplet size and distribution of droplet sizes and of sufficiently small diameter to meet the requirements of an aerosol. Additional safety considerations relate to the potential aggressiveness of disinfectant chemicals. This means applicators must be designed and developed to cope with the standard range of proprietary disinfectants, without sustaining damage through any corrosive effect of the chemical.

The applicator must simultaneously satisfy a range of requirements through its versatility of use and robustness. With regard to safety and convenience, the applicator should be operated free-standing and by remote control, to ensure the operator(s) is not within the enclosed space while treatment is in progress. However, there will be situations like railway carriages, aircraft cabins, ship's cabins and series of small not interconnected rooms where portable units carried by the operator may be required.

Overriding requirement of application method and applicator specification is capacity to produce and alter as necessary

Indoor disinfection presents a wide spectrum of situations of different size and shape."

droplet size and droplet size distribution to fulfil the dual and specific requirements of space and surface disinfection. There are many small and inexpensive electrical sprayers which can be carried or placed on a table while applying disinfectant and which may work to an extent within small enclosed spaces or rooms. However, they will invariably generate non-uniform, heterogeneous droplet spectra with limited reach and coverage, which makes them unsuitable for successful disinfection of larger surface areas and space volumes.

Cold fogging with water based formulations

The only efficient and safe way to achieve complete and effective indoor coverage is by fogging the chemical disinfectant through custom-designed, professional fogging machines which can effectively apply

chemical disinfectant using water as the carrier liquid. Swingtec GmbH of Germany has a range of cold fogging machines which meet all the requirements outlined above for effective, versatile and safe disinfection of indoor spaces and surfaces using water as the carrier liquid. "Air (space) disinfection and surface disinfection combine to fulfil the complete and effective disinfection process" says Swingtec, while highlighting how requirements of droplet size and therefore droplet behaviour are very different for space and surface disinfection.

Air disinfection requires the generation of ultrafine droplets which stay suspended as an aerosol to disinfect the entire space including the nooks and crannies that otherwise would be hard to reach. Surface disinfection requires a larger size of droplet, but still able to stay suspended in the air for sufficient time before they sediment and impact evenly onto all surfaces – walls, ceiling and floor.

"Our professional machines come equipped with range of nozzles and restrictors which allow flow rates to be adjusted accordingly for production and delivery of larger or smaller droplets," says Swingtec. Electrically-driven cold foggers which are custom- designed for stand-alone, remote operation and with water as the carrier liquid are the first and foremost choice for indoor disinfection. Swingtec offers two highly professional models depending on the area/volume to be disinfected from a single standing position.

Fontan Starlet

The Fontan Starlet, which is operated from a standing (stationary) position and equipped with a spray gun, is designed for the disinfection treatment of small rooms and spaces. Fontan Starlet is designed for the disinfection of rooms up to 500 m² in area and 2000 m³ in volume, which in practical terms means, for example, a room measuring 20 m in length, 10 m in width and 10 m high. This will include a whole range of situations for high priority disinfection including open-plan offices, classrooms, laboratories, hospital wards and doctors' surgeries.

Fontan Starlet is offered in two different versions, a standard version with a brush-type motor and a stainless-steel version with a brushless turbine, the latter developed for disinfection using more aggressive chemical formulations such as hydrogen peroxide and even per-acetic acid that aggressively attack



Fontan Compactstar in place and ready for action in a Romanian school.

Image credit: Swingtec GmbH

standard steel and coloured metal materials. Extra volume versatility is offered by different size options of the fog liquid chemical tank, namely the six-litre, 11-litre and 34-litre sizes, all made of polyethylene and supplied with compatible tank holders.

The Fontan Starlet is a machine of compact dimensions measuring 37 x 30 x 36 cm (without fog liquid tank). Empty weight is 12.7 kg and 11.0 kg for standard and stainless steel versions respectively. Power specifications are 1.5kW single phase AC (standard version) and 1.2 kW single phase (stainless steel version) output when measured with water.

This highly adaptable and versatile cold fogging machine can be operated in either ULV (ultra low volume) or LV (low volume) modes by selecting the appropriate dosing nozzle. In ULV operational mode all dosing nozzles, of stainless steel as standard, deliver a droplet volume median diameter (VMD) of < 30 µm.

- **Standard version:** Liquid output rate for ULV application is 0.8 l/h up to 7.9 l/h depending on dosing nozzle used and 10.7 l/h without a dosing nozzle. Equivalent rates for LV application are 1.9 l/h up to 26.2 l/h depending on dosing nozzle and 44.6 l/h without a dosing nozzle.
- **Stainless version:** Liquid output rate for ULV application is 0.7 l/h up to 6.5 l/h depending on the dosing nozzle used and 8.7 l/h without a dosing nozzle. Equivalent rates for LV application are 1.7/h up to 25.8 l/h depending on the dosing nozzle used and 41.0 l/h without a dosing nozzle.

Fontan Compactstar

For much larger areas and volumes is the Fontan Compactstar, an electrically-driven cold fog aerosol applicator. The Fontan Compactstar is a semi-automatic machine started manually but stopping automatically when the fog liquid tank has been emptied by the operation or after a pre-selected volume of fog liquid has been discharged. The solution line and the nozzle system are rinsed manually from the rinsing bottle.

This machine features a stator in the ventilator tube and developed by Swingtec to allow treatment of a large room, with a correspondingly large surface area and volume (space). The space and surface area is treated effectively and efficiently from a single position and without having to move the machine. The stator provides uniform vertical and horizontal distributions of droplets over an area of approximately 60 m x 40 m, large by any reckoning and typically including factory floors, warehouses and abattoirs. Even larger areas and volumes can be accommodated by the installation of complementary fans for simultaneous operation with the Fontan Compactstar.

The low pressure operation system of 0.35 bar afforded by the Fontan Compactstar allows the operator to use relatively large size (diameter) nozzles. This in turn permits use of suspension powder delivery systems (formulations) to be easily and adequately discharged through the cold fogging machine.

Despite the size and scope of treatment achieved, the Fontan Compactstar is a relatively light-weight and compact unit

weighing in at 35 kg without the fog liquid tank, and measuring 65 x 40 x 84 cm without the fog liquid tank. Air flow and volume capacity achieved by the axial ventilator with stator is 4850 m³/h. Power specification is 1.1kW single phase AC.

This large capacity but still highly versatile cold fogging machine has two sizes of fog liquid tank, 15-litre and 34-litre, each with an integral pneumatic mixing device function which can be disabled if required. Liquid output, calibrated and measured using water, is 2.9l/h to 8.6l/h depending on the size (diameter) of dosing nozzle fitted. The volume median diameter (VMD) of droplets produced for all standard, stainless-steel, dosing nozzles is <30µm.

Hot fogging on the move using water

There are situations such as railway carriages, aircraft cabins, cruise liners and series of small interconnecting rooms where the fogging machine may have to be carried while in operation. This will require use of thermal or hot foggers designed to use oil or solvent based carrier liquids to disperse the chemical which clearly places environmental and human safety restrictions on use of thermal foggers for wholesale indoor disinfection.

Without special modification the standard 'run-of-the-mill' thermal fogger cannot cope with a water-based fog liquid, because when operated with water is unable to generate the narrow and homogenous droplet spectrum below 30 µm VMD (Volume Median Diameter) in accordance with WHO specifications. The droplet spectrum produced with water-based fog liquids is much wider with droplets from 0 µm up to 200 µm. Those in excess of 40-50 µm are unable to suspend as aerosol droplets in the air. Instead they settle and sediment in front of the fog generator to form wet spots and unacceptably large and concentrated chemical deposits.

Swingtec overcame and solved this problem by designing an attachment called the 'High Performance Fogging Tube' which was custom designed to allow its Swingfog thermal fogging machines to use water-based fog liquids. When fitted with the 'High Performance Fogging Tube', instead of the standard one, the portable Swingfog SN 50 thermal fogger generates a droplet spectrum below 30 µm using liquid (water) flow rates of up to 27 litres/hour. The same benefits are achieved with Swingtec's larger



Fontan Starlet stainless steel unit deployed for disinfection of an operating theatre at a hospital in Germany.

Image Credit: Swingtec GmbH

This machine features a stator in the ventilator tube and developed by Swingtec to allow treatment of a large room, with a correspondingly large surface area and volume (space)."

truck-mounted or stationary thermal foggers. Thus the same ideal droplet spectrum is achieved by fitting the 'High Performance Fogging Tube' to the Swingfog SN 81 and SN 101 thermal foggers operated at liquid (water) flow rates of up to 60 litres/hour.

In summary the benefits of Swingtec hot and cold fogging technology for indoor disinfections are:

- Cold fogging machines and hot fogging machines, the latter fitted with the custom-designed 'High Performance Fogging Tube', can be used to fog a wide range of chemical disinfectants using water as the carrier liquid
- Excellent air (space) disinfection and surface disinfection is achieved
- Use of water-based fog liquids is cost effective and safe for operators, the public and the environment
- The Swingtec ranges of hot and cold foggers means operators can disinfect a spectrum of space volumes and surface areas effectively and efficiently using machines operated in portable, stationary and truck-mounted modes as appropriate
- Hot and cold fogging provides a versatile application option in speed and frequency of indoor disinfection.

The indoor situations described here (transport, hospitals, schools, factories, offices), in relation to disinfection against the on-going worldwide Coronavirus (Covid-19) pandemic, will be subject to

Authors' note

Covid-19 – two way movement between man and animals

COVID-19 IS A zoonosis virus originating in animals and subsequently transferring to humans, but since the corona virus pandemic started there has been a not inconsiderable transfer of disease in the other direction from humans to animals.

What's more, some of the most concentrated outbreaks of human disease have occurred in abattoirs, meat processing plants and other food production factories. Meat processing plants and other food production premises face a complicated mix of issues which may result in higher rates of virus transmission. Research suggests that the virus particles persist on surfaces for a longer period of time in the low temperature conditions required in these food manufacturing plants. In addition maintenance of social distancing on production lines is difficult for workers who will often live together in housing provided by their employer.

Perhaps the biggest outbreak of this virus disease in captive mammals, following transfer from infected humans, was in Denmark where the entire mink farm population of some 17 million animals was culled. Of particular concern was the development of a 'mink strain' of the virus and fears this could be passed back into the human population via workers at the farm.



Fontan Twinstar 'primed for action and disinfection' at a beverage bottling plant in Romania.

Image credit: Swingtec GmbH

regular and routine programmes of cleaning. As such the accumulation of dirt and grime which could affect the efficacy of fogged disinfectant should not be a problem. This is in direct contrast to the disinfection of poultry houses and livestock premises where accumulation of high deposits of dirt and animal and feed debris is known to impact on the efficacy of disinfection by fogging. Disinfection by fogging in animal production is still critically important but only as a 'terminal disinfection' at the end of a thorough cleaning programme. ■



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Section One - Supplier listings by categories

Section Two - List of suppliers

Section Three - Contact details of agents in Asia

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WHEN CONTACTING YOUR SUPPLIERS**

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Chemicals

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Horticultural Equipment

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Micro irrigation system receive an upgrade with AlphaDisc's new filter

AlphaDisc's precise depth filtration is monitored by a remote sensing system and algorithms that provide farmers with online data and insights.

DRIP IRRIGATION METHODS are far more efficient than other conventional methods, such as sprinklers and flooding, because it reduces water loss by evaporation; as the water is distributed through a network of valves, pipes, tubing and emitters.

The use of micro irrigation technology has resulted in increased cropping and irrigation intensity, which has had a significant impact on resource conservation, cultivation costs, crop yield, and farm productivity. This technology has piqued the interest of policymakers and the government, due to its perceived ability to significantly contribute to agricultural productivity and economic growth.

Netafim, a specialist in precision irrigation solutions, has launched the AlphaDisc filter to deal with the degrading water quality in micro drip irrigation. The filter will protect irrigation systems against clogging, and will enable growers to irrigate crops more uniformly, resulting in better productivity and cost savings.

Up to 70% of the water used for agriculture is surface water from reservoirs, lakes, canals, and ponds, containing considerable amounts of algae and other organic contaminants that significantly increase the risk of clogging. With water quality constantly deteriorating due to climate change, pollution, and the growing usage of reclaimed water, growers need an effective filtration system, to prevent full and partial clogging, and sustain a long-functioning irrigation system.

Researched and developed in partnership with Amiad, a global producer of water treatment and filtration solutions, AlphaDisc combines precise depth filtration with substantial capacity to contain dirt, and a unique easy-to-scale modular design, that helps to manage and change the flow rates



Image credit: Netafim

The filter will protect irrigation systems against clogging caused by organic contaminants.

and water quality needs. It is monitored by a remote sensing system, and algorithms that provide farmers with online data and insights.

AlphaDisc's unique and improved disc, designed with precise high-grade filtration through all depths of the disc, provides better clogging protection. High filtration volume and area, coupled with low rates of head loss in the industry, ensures higher particle capture, fewer backflush cycles, and less downstream disruption. The AlphaDisc smart controller provides an 'always on' access to filtration data; IP65 rating and smaller environmental footprint with a

AlphaDisc represents a new generation of high-tech filtration systems that protect irrigation systems."

vertical installation are an added bonus.

"At Netafim we are committed to working with cutting-edge partners to develop solutions to combat the far reaching effects of global water scarcity and improve water quality for growers," said Netafim CEO Gabriel Miodownik. "AlphaDisc helps growers adapt to changing conditions and stay productive through the efficient use of available surface water. AlphaDisc ensures a sustainable and reliable clean water supply, protecting the future of agriculture."

"AlphaDisc represents a new generation of high-tech filtration systems that protect irrigation systems while offering performance data measurement so growers can precisely monitor and control their valuable resources," said Dror Negbi, global filtration product manager, Netafim. "Through our partnership with Amiad, we have developed an innovative product that delivers high-quality water and enables growers to maximise an increasingly limited resource." ■

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Micro irrigation systems to grow at a CAGR of 13% by 2031

A STUDY BY Future Market Insights suggests that the global micro irrigation systems market will grow at a CAGR of 13% between 2021 to 2031. The growing population and increasing food demand across the globe, are the primary drivers of growth.

According to a census conducted by the International Commission on Irrigation and Drainage (ICID), the acres of micro-irrigation have increased by 25 times, over the past three decades. Increasing adoption of micro irrigation systems in developing economies, coupled with relatively low costs of purchase and installations, is more likely to create positive growth prospects in the assessment period.

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