

Probiotics to boost broiler performance

Crops:

Combatting Panama disease
in Cavendish bananas

Livestock:

Enhancing cattle breeds
through gene editing

Technology:

Building resilience through
agroecology



VIV Asia 2023 preview - p7

Poultry
Buyers' Guide
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Far Eastern Agriculture



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EVENTS 2023

MARCH

01-03

HortEx Vietnam

Ho Chi Minh City, Vietnam
www.hortex-vietnam.com

08-10

VIV Asia 2023

Bangkok, Thailand
www.vivasia.nl

MAY

24-25

AGRIFUTURE Conference

Bangkok, Thailand
www.agritechnica-asia.com/agrifuture

JUNE

07-09

ILDEX Philippines

Manila, Philippines
www.ildex-philippines.com

20-21

Malaysia Palm Oil Expo (MAPEX)

Sabah, Malaysia
www.palmoilfair.com

JULY

05-07

Livestock Philippines 2023

Pasay City, Philippines
www.livestockphilippines.com

SEPTEMBER

20-22

ILDEX Indonesia

Jakarta, Indonesia
www.ildex-indonesia.com/

GOOD Meat receives green light to commercialise serum-free media



Image Credit: Eat Just, Inc.

GOOD Meat R&D team members working at the company's cultivated meat facility.

GOOD MEAT, THE cultivated meat division of food technology company Eat Just, Inc., announced it has been given a new, first-in-the-world regulatory approval by the Singapore Food Agency (SFA) for the use of serum-free media for the production of cultivated meat.

This technical and regulatory milestone will lead to greater scalability, lower manufacturing costs and a more sustainable product. It also paves the way for the production of larger quantities of high-quality chicken made from cells instead of slaughtered animals. With the latest regulatory approval for serum-free cultivation media, the US-based food tech firm will soon transition to a more efficient and favourable production process.

“Not too long ago, observers thought removing serum was a major limiting step to scaling cultivated meat. I could not be prouder of our team for doing just that and receiving approval to commercialise it this week. It's yet another step forward for our company, the cultivated meat industry and the health of our planet,” said Josh Tetrick, co-founder and CEO of Eat Just.

The facility will house the single-largest bioreactor in the cultivated meat industry. The news comes as bioreactors are being installed as part of the construction process of GOOD Meat's Singapore production centre, having the capacity to make tens of thousands of pounds of meat. The demonstration plant running the serum-free production process will open in 2023.

New loan to support Philippines agriculture sector

THE ASIAN DEVELOPMENT Bank (ADB) has approved a US\$500mn policy-based loan to help the Government of the Philippines expand economic opportunities in agriculture while ensuring food security for the population.

The loan supports Subprogram 2 of the Competitive and Inclusive Agriculture Development Programme, which aims to further develop the agriculture sector with trade policy and regulatory framework reforms. It also seeks to enhance public services and finance for the sector, and social protection for rural families affected by the programme's reforms. In addition, the loan promotes new government initiatives, including the provision of unconditional cash transfers to smallholder rice farmers and concessional loans to agriculture- and fishery-based micro, small enterprises, smallholder farmers and fisherfolk under COVID-19 recovery and other credit assistance programmes.

Exclusive interview with Olaf Naehrig, at VICTAM Asia 2022

Olaf Naehrig, senior area manager at Amandus Kahl speaks with Far Eastern Agriculture on what makes their pellet mills unique with their Expander technology.

Far Eastern Agriculture (FEAG): Can you give us an overview about your company?

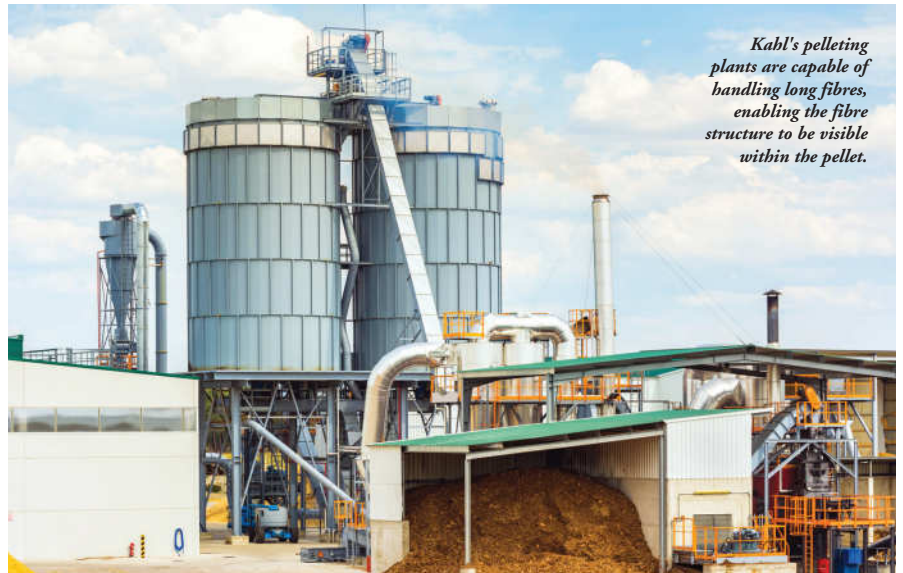
Olaf Naehrig (ON): We are Amandus Kahl, a German equipment manufacturing company comprising of more than 900 employees, having branches and offices in various countries, to support the local markets. Our main business is animal feed, but we are also part of the biomass, pelleting, recycling, chemical, and food industries.

FEAG: How do you think COVID-19 has affected your business?

ON: COVID-19 has had an impact, of course, in the way we can work in Germany. We have to comply with the rules, and that is the first big impact. Secondly, we do international business and COVID-19 has reduced international travel activities a lot. However, investment has continued over time, sometimes being slower, and sometimes faster. Since people in the feed industry need to eat, we have to do something that continues to work. The third impact is from the labour end, since COVID-19 forced workers to move back to their homeland. Apart from COVID-19 however, a number of other factors such as the energy crisis, commodity crisis and supply chain problems have created momentum for people to do something different. Hence, interesting projects are now under threat for us.

FEAG: Can you tell us about your latest products and what makes them unique?

ON: We introduced the Expander almost 40 years ago to the market. This gives you a lot of new options and features to treat the feed differently, just by letting the pellet mill shape the pellet. Now, it is not a starch



Kahl's pelleting plants are capable of handling long fibres, enabling the fibre structure to be visible within the pellet.

Image Credit: Adobe Stock

gelatinising machine, or a machine to help you reduce anti-neutral substances. The expander comes with a different approach. You have a dedicated system where you have energy input to do cooking and you have the starch gelatinisation process to make the fibres more digestible. Hence, shaping the pellets with very low energy inputs on the pellet mill results in higher capacity, higher PDI of the pellets and good nutritional aspects. All these make it a very good combination.

FEAG: What level of competition are you facing from other markets and industries?

ON: We go to markets where our products are required by customers because they see

“ We have a dedicated system where you have energy input to do cooking and the starch gelatinisation process to make the fibres more digestible.”

the advantage there, whereas in other markets, we only supply single equipments because the expectations in the market are also different when it comes to the overall investment costs. That is how we evaluate different markets worldwide, and then put our efforts into markets that are worth handling, where we see the potential for our equipment, and also where the customers request us to participate. So, this means that here in Southeast Asia, we mainly focus on single machines such as the expander, the roller mill, and the vacuum quarter. We also have the new vacuum quarter and fishery which currently has a huge demand because of our special technology that is capable of solving customers' problems.

FEAG: Do you have any plans of expansion?

ON: We have our ‘Made in Germany’ approach and this is something we will continue. From this point of view, you can see that we will increase our efforts more to provide better service, be more present in the markets, and then utilise the German base to supply our equipment. Hence, it will be more reasonable to grow in the future accordingly, but faster than the market would, of course. ■

Food Price Index sees yearly rise despite December drop

IN DECEMBER 2022, the FAO Food Price Index (FFPI) averaged 132.4 points, down 2.6 points (1.9%) from November, marking the ninth consecutive monthly decline and standing 1.3 points (1%) below its value a year ago. However, for 2022 as a whole, the FFPI averaged 143.7 points, up from 2021 by as much as 18 points, or 14.3%.

The FAO Cereal Price Index averaged 147.3 points in December, down 2.9 points (1.9%) from November, but still 6.8 points (4.8%) above its December 2021 value. For 2022 in its entirety, the FAO Cereal Price Index reached a new record high of 154.7 points, up 23.5 points (17.9%) from 2021, surpassing by 12.5 points (8.8%) the previous annual average record registered in 2011.

The FAO Vegetable Oil Price Index averaged 144.4 points in December, down 10.3 points (6.7%) from November and hitting its lowest level since February 2021. Lower crude mineral oil prices also exerted downward pressure on world vegetable oil quotations. For the year 2022, the FAO Vegetable Oil Price Index



Image Credit: FAO

averaged 187.8 points, up 22.9 points (13.9%) from 2021 and marking a new record annual high.

The FAO Dairy Price Index averaged 139.1 points in December, up 1.5 points (1.1%) from November, registering an

increase after five months of consecutive declines and surpassing the previous value by 10.1 points (7.9%) its value a year ago. In 2022 as a whole, the FAO Dairy Price Index averaged 142.5 points, up 23.3 points (19.6%) from 2021 and registering the highest annual average on record since 1990.

The FAO Meat Price Index averaged 113.8 points in December, down 1.4 points (1.2%) from November, marking the sixth consecutive monthly decline, but remained 2.8 points (2.5%) above its year-earlier level. In 2022 as a whole, the FAO Meat Price Index averaged 118.9 points, up 11.2 points (10.4%) from 2021, marking the highest annual average registered since 1990.

The FAO Sugar Price Index averaged 117.2 points in December, up 2.8 points (2.4%) from November, registering the second consecutive monthly increase and reaching its highest level in the past six months. Overall, the FAO Sugar Price Index for 2022 averaged 114.5 points, up 5.1 points (4.7%) from 2021 and reaching its highest annual average since 2012.

HortEx Vietnam 2023 to bring industry experts together

HORTEX VIETNAM IS the first specialised International Exhibition and Conference for horticultural and floricultural production and processing technology in Vietnam.

Vietnam is a huge emerging market with a population of nearly 99 million. The country has been securing socio-political stability, and is known to be one of the most dynamic economies worldwide. Since 1991, the economic growth has averaged an impressive 7.5% each year.

The nation is now in a strong position in terms of population structure with 60% of its populace being at a working age. Adding to this, it is a market economy, a member of the WTO, and a party to multiple frameworks for international economic integration, including free trade agreements with partners both within and outside the region.

The IMF recently lifted the growth rate forecast for Vietnam by a full percentage point to 7% for 2022 and 6.7% for 2023. Furthermore, it is among nine nations in the world with the fastest growing middle-class in the coming decade, with an expected 36 million people to be included by 2030. With these figures, Vietnam is by far the fastest growing economy in the ASEAN (Association of Southeast Asian Nations) region.

Horticulture and floriculture are one of the most promising sectors



Image Credit: HortEx Vietnam

Vietnam is a huge emerging market.

of the Vietnamese economy, with experts highlighting the potential for Vietnam to become one of the world's largest flower exporters.

At HortEx Vietnam 2023, participating businesses will have the opportunity to meet and discuss directly with potential customers, enhance promotion and export activities for this promising market. The exhibition attracts professionals, buyers and visitors from Vietnam and countries from the region and around the world.

VIV Asia 2023: A must-attend for all professionals in animal protein protection

FROM 8-10 MARCH, VIV Asia will take place in Bangkok, Thailand. The Asian and worldwide industry, hosting around 1,200 exhibitors, will gather again after four years at the most complete feed to food event of this region, once again providing the industry professionals with the opportunity to seek and discover new suppliers and techniques to make good on the goals they have set out for this new year. All will take place at a new mega-sized venue: IMPACT!

Prepare your visit – exhibitor list online

Organisers and exhibitors are preparing for VIV Asia, making sure to offer the attendees an unforgettable visit. On the website a complete overview of the exhibitors can be found, with new ones being added daily. During VIV Asia 2023, visitors can also have the exhibitor list at hand through the mobile VIV Connect app, so nothing interesting will be missed. It can be used as an overview with the possibility to filter the exhibitors by products and services according to the interest of the visitor. Selecting exhibitors has been made very user-friendly: just press 'search' and prepare your visit!

Fly with a discount

VIV Asia has reached new partnerships to make travelling for visitors as easy and convenient as possible. Arrangements have been made with several airlines for discounts when flying over to visit VIV Asia. Visitors can check their connection



VIV Asia will take place from 8-10 March 2023.

to Bangkok and make use of this opportunity when arranging the airplane ticket. The available airline options can be found on the website of the show.

Free transfer to new venue impact

What if you do not know your way around Bangkok? Or if you are not familiar with the new venue? No worries, all visitors can hop on the free shuttle service from Bangkok's city centre to IMPACT and back again. There will be two routes available from the city centre with prior online reservation. The reservation for a free

shuttle trip can be made two weeks prior to the show.

Conferences with high level speakers

Partners, exhibitors and organisers work together to present visitors with an extensive programme of more than 100 sessions. With around 200 high level speakers flying in from all over the world, it holds promise of a conference programme that offers suitable information and insights on all aspects of the market, for all visitors. One tip: plan ahead to get the best information for your business.

Largest trade show in Asia

VIV Asia is the largest trade show in Asia dedicated to the world of livestock production, animal husbandry and all related sectors, from feed production, to animal farming, breeding, veterinary, animal health solutions, slaughtering and processing of meat, fish, egg, dairy products and more. Around 1,200 exhibiting companies will be there to welcome and inspire industry professionals from more than 120 countries.

Register on the website: www.vivasia.nl



Partners, exhibitors and organisers work together to present a programme with more than 100 sessions.

Probiotic solutions to boost broiler production

Yeast probiotics have emerged as a safer and more effective alternative to antibiotics, offering advantages for the entire broiler production chain.

THE GLOBAL POULTRY probiotics ingredients market is expected to grow at a CAGR of 5.6% over the period of 2022-2028, according to a report by Business Wire.

Expanding consumer demand for protein-rich food ingredients, meat and egg products and dietary supplements have been the major drivers for this growth. Moreover, rising awareness among farmers regarding the importance of poultry health and nutrition is yet another factor triggering market growth. According to the report, the Asia-Pacific region is projected to be the fastest growing market, with China and India being the top contributors.

Antibiotics have long since been used as growth-promoting agents in both humans and animals. However, the quick build up of resistance is what makes them a biological threat to both human and animal health. With this awareness having come to light in the recent years, antibiotics have now been replaced by probiotics that are capable of altering the intestinal and microbial environment, thereby promoting growth and preventing infectious diseases. Probiotics being natural growth promoting agents are hence considered to be safer alternatives that are found to be far more effective than antibiotics.

Boosting poultry production with yeast probiotics

The live yeast strain *Saccharomyces cerevisiae* boulardii CNCM I-1079 is the first and only feed additive authorised by the European Union authorities (EFSA) to reduce carcass contamination by *Salmonella* spp. in broiler chickens. In fact, this yeast strain has been found to greatly increase the quality of broiler chickens by significantly reducing the feed to meat ratio.

In 2018, a trial was performed over a



Image Credit: Adobe Stock

duration of 35 days at an experimental farm where mixed-sex broilers were fed a three-phase pelleted diet and kept in conditions resembling a typical European farm. During the last phase of the trial, a majority of the animals were attacked by an infectious bronchitis virus, causing the overall mortality to reach 14.4%. Although this was unplanned, it gave researchers an opportunity to study the effect that the virus had on probiotic yeast-fed broilers.

Results in supplement-fed broilers showed:

- 42% decrease in mortality rate
- Better resistance to the bronchitis virus, thereby reducing mortality by 33%
- Significant improvement in overall zootechnical performance

From this study, researchers were able to draw the conclusion that broilers fed probiotic yeast could indeed resist a number

of health challenges and live longer.

Antibiotics vs probiotics – Which is better?

Another trial involving 10,000 chickens was conducted in the Philippines to compare the effect of a feeding programme on two groups of chickens. One group was fed with *Saccharomyces cerevisiae* boulardii CNCM I-1079 and the other group with antibiotic growth promoters (AGP).

The following results were drawn from the study:

- Chickens fed with *S. boulardii* showed a 25% decrease in mortality rate compared to those fed with AGP
- A 2% increase in body weight was also observed in *S. boulardii*-fed chickens compared to those fed with AGP

These studies show that feeding yeast probiotics to poultry can have an overall positive effect on every stage of the production chain, from bird health and performance to final product quality.

Levucell SB – An efficient yeast-based feed additive for swine and poultry

One good example of a yeast-based feed additive based on viable cells of the *Saccharomyces cerevisiae* strain is Levucell SB, currently authorised as a zootechnical additive for weaned piglets, sows, and

“The live yeast strain greatly increases the quality of broiler chickens by reducing the feed to meat ratio.”

chickens. It has been marketed in three formulations with varying concentrations and has proven to have a positive impact on the productivity and health of broiler chickens.

A study conducted in December 2022 showed that Levucell SB Titan Plus had the ability to quickly restore normal intestinal microflora and protect it from the influence of adverse factors. It was found that the live yeast *Saccharomyces cerevisiae boulardii* could stimulate the enzymatic activity of the intestines, thus increasing the absorption of nutrients in the feed. They were also capable of synthesising vitamins and converting trace elements into more accessible proteinate forms, thereby contributing to a better supply of micronutrients in the body. Moreover, the fact that yeast is not sensitive to antibiotics means that they can be used simultaneously with them.

New reference yeast probiotic launched at IPPE in Atlanta

On 24 January 2023, Phileo by Lesaffre

announced the poultry sector launch of its successful Actisaf Sc 47 HR+ probiotic, which was unveiled at the International Production & Processing Expo (IPPE), held from 24-26 January 2023 in Atlanta.

This probiotic, which has earned its name across the ruminant and swine sectors, has now also been released for use by the poultry industry. The unique Actisaf Sc 47 HR+ microspherule form has been developed to deliver intrinsic resistance in pelleting feed to combined temperature, friction and moisture without the need for foreign material coating. Moreover, the probiotic has continued to deliver feed efficiency and production performance gains in poultry trials across the world.

Different poultry studies have demonstrated the positive effects of Actisaf Sc 47 HR+ on intestinal microbiota diversity, gut function, and nutrient digestibility. Trials conducted in the US and China demonstrated that supplementing

the diet of birds with Actisaf Sc 47 HR+ helps to increase body weight, compared to birds in both control groups and antibiotic groups.

Another recent field trial was carried out in 2022 on a broiler farm in Eastern Europe, where broilers were floor-raised for 39 days in two houses. In the first house, the birds were fed a basal feed without yeast probiotic supplementation. In the second house, birds were fed a basal feed supplemented with 400 g/T of Actisaf Sc 47 HR+. At D39, broilers in the Actisaf Sc 47 HR+ group achieved better production performance across all parameters including body weight, survival rates, and feed efficiency among others. The trial also yielded in an 8:1 return on investment (ROI) for the broiler farm.

The probiotic's IPPE launch hence marks the beginning of a new phase in the journey of Actisaf Sc 47 HR+ as a multi-species brand, providing Phileo with the strongest possible start to 2023. ■



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Meeting future challenges through genetic diversity

Different methods of encouraging genetic variation are producing more profitable livestock, with traits more suited to deal with the trials of tomorrow.



Gene editing can offer the possibility of introducing changes which would otherwise take generations to occur.

Image Credit: Adobe Stock

IT IS WELL understood that genetic diversity in livestock is a crucial part of successful management. By encouraging genetic variation (most commonly achieved through breeding programmes), animals can become more resistant to diseases, changes in climate and pests, for example. Alongside improving a herd's adaptability to future challenges in this way, economically important traits such as reproduction rates, life expectancy, product quality (such as milk from dairy cows) and general health can be developed and these will accumulate in the population generation after generation.

Breeding beneficial traits

In this increasingly climate conscious world, there have even been attempts to encourage

more environmentally-friendly livestock through the process of breeding. One such scientific study, carried out in Spain and published in the *Journal of Dairy Science*, analysed the impact of incorporating enteric methane into the breeding objective of dairy cattle. It found that in doing so, total methane emissions in the dairy industry in Spain were estimated to decrease between 2 and 5% in the next 10 years due to positive

By encouraging genetic variation, animals can become more resistant to diseases, changes in climate and pests."

genetic trends for milk yield and an expected decrease in the total number of dairy cows. It suggested that it was possible to achieve a 20% reduction of methane production in 10 years via selective breeding but at the expense of a larger ad hoc weight of methane in the selection index and decelerating the genetic gain for production traits from 6% to 18%. Ultimately, this highlighted the potential of including environmental traits in the selection indices while retaining populations profitable for producers.

In a separate paper published in June 2022, researchers identified new breeding opportunities for cattle owned by smallholder farmers in Indonesia whilst conserving unique local beef brands. It noted that while crossbreeding had been

practiced in the country for some time, well-designed programmes had so far been neglected, resulting in mixed-breed animals and no ability to determine genetic composition, productive capabilities or adaptation to environmental stressors. According to the study, the greatest opportunity to significantly improve the productivity of all livestock industries in low-middle income countries in tropical environments, is through the use of genomic information. It suggests the best way to design new cattle breeding programmes in the country would be for Indonesian researchers to establish international collaborations to develop the opportunities provided by genomic technologies. By genotyping animals in the breeding programmes, they would be able to determine whether breeds are unique (and thus require conservation as pure breeds); confirm chromosome imbalances; assist in the design of within-breed selection, crossbreeding and conservation programmes; and provide basic information needed for ongoing studies to identify genes or genomic regions in cattle breeds that account for large proportions of genetic variation in economically important traits.

Thereafter, the international collaborations would potentially also assist in the design and implementation of new breeding programmes. Furthermore, genomic information would also allow the design of crossbreeding programmes based on precise knowledge of the breed composition of all animals, thereby ensuring breeding females are joined to appropriate bulls in order to generate well-adapted and productive crossbred progeny. The authors of the study noted that that with the demand for beef in Indonesia outstripping supply – requiring 30-40% of beef to be met by imports – the sustainable utilisation and genetic improvement of local cattle is vitally important. Improvement programmes with well-established breeding goals should therefore be designed and implemented to improve the ongoing productivity and profitability of smallholder farmer herds, as well as to conserve unique Indonesian genetic resources.

Genome editing

Of course, researchers are constantly working to help the agricultural industry and cultivate livestock aptly suited to meet future demands. In the case of tropical pastures, plagued by issues such as heat stress, parasites and diseases, biotechnologies have played an important role in cattle production and health. For instance, genome editing (GnEd) offers opportunities for cattle breeding as it can be used to fix target alleles for monogenic traits, delete undesirable recessive alleles and increase the frequency of favourable alleles for polygenic traits. It can offer the possibility to bring in changes to livestock which could otherwise take generations to occur as single or multiple alleles associated with desirable traits can be moved into another breed without crossbreeding. This represents a powerful tool, alternative to conventional breeding methods, which has found favour in the tropics and not just for animals – pastures have been treated with GnEd to have an increased digestibility and drought tolerance to provide better quality forages to feed animals throughout the year.

This is certainly a trend that is gaining global momentum. In one of the most recent examples last year, US regulators cleared the way for the sale of beef from gene-edited cattle after the Food and Drug Administration (FDA) concluded the animals do not raise safety concerns. Cattle by Recombinetics have genes altered with a technology called CRISPR to have short coats that let them more easily stand hot weather, therefore avoiding heat stress. The FDA



Image Credit: Adobe Stock

Breeding programmes can lead to valuable traits such as better milk quality being developed in livestock.

fast-tracked approval for the human consumption of the meat, as the cattle have genetic makeups similar to that of other existing cattle with the aforementioned trait occurring naturally in some breeds.

The gene-edited trait can be passed down so that new generations of cattle will have shorter coats, thereby making the beef production more sustainable while improving their welfare. With ever-increasing clarity around genetic diversity and the methods for encouraging it, there is little doubt that this will play an even greater role within the agricultural industry as it struggles to meet the pressures of an ever-expanding global population alongside environmental considerations. ■

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Sustainable alternatives to toughen up aquatic immunity



Image Credit: Adobe Stock

Diseases are seen as a major threat to aquatic animal production.

A number of safe and effective alternatives are being used in place of antibiotic treatments to chart a healthy and profitable future for aquaculture.

THE GRADUAL GROWTH in global population brings with it a rise in demand and consumption of aquatic animals. The OIE Aquatic Animal Health Safety Strategy 2021-2025 report mentions that aquatic animal production has seen a rapid growth over the years and has been significantly contributing to human nutrition, poverty alleviation and sustainable development.

According to the report, the demand for aquatic animals is predicted to rise by at least 32% by 2030. Moreover, it is estimated that 17% of animal products and 7% of all protein currently consumed globally comes from aquatic animals. Since aquatic animal production plays a major role in supporting livelihoods, especially in low- and middle-income countries, growth in production is also considered essential in achieving many of the United Nations Sustainable Development Goals (SDGs) aimed at ending poverty and hunger, while

also ensuring good health and wellbeing, responsible consumption, and sustainable production and use of marine resources.

Aquatic animal diseases

Diseases are seen as a major threat to aquatic animal production. As production increases, new species are domesticated, and trade increases. As a result, new diseases are likely to emerge and have a significant impact on production, livelihoods, and the environment. Hence, management and reduction of disease transmission becomes a priority to maintain the growth of

According to the OIE report, the demand for aquatic animals is predicted to rise by at least 32% by 2030.”

aquaculture production.

Some effective measures to help reduce disease transmission include:

- Installation of a secure fences or boundaries to prevent wild animals from entering
- Limiting access to staff and visitors, and ensuring the provision of biosecurity measures while entering and exiting farms
- Ensuring that all animals entering farms are disease-free and exercising caution while moving animals between different farm populations
- Periodically preparing and disinfecting equipment, materials and tools to prevent the diseases from emerging
- Obtaining good quality water from non-polluted sources for culture operations, and having provision of water reservoirs to adequately stock culture water, prior to being used in culture ponds
- Preference on high quality, formulated feeds that are adequately treated and tested for disease
- Ensuring that proper management of waste containment, collection and disposal are in place, in line with

regulatory requirements

To further raise farm-level awareness, a number of Asian countries like India, China, Malaysia, Indonesia and Vietnam, have started using published extension bulletins, leaflets, posters, farmers' handbooks, fact sheets and reports to raise awareness and educate farmers about the latest aquaculture practices, emerging diseases, and respective biosecurity measures to be taken to combat these diseases.

Dangers of antibiotic use

The pressure for production has resulted in the widespread adoption of antibiotics as necessary tools for disease management, especially among fish and shrimp farmers. However, the real danger lies in the inappropriate and irrational use of antibiotics, which can often lead to the emergence of resistant bacteria, thus bringing about decreased effectiveness to treat human infections.

Studies from Bangladesh, India, Indonesia, and Thailand have reported the presence of antibiotic residues in aquaculture products and water. Moreover, drug-resistant bacteria have been found to claim the lives of more than 30,000 people in Asia, 35,000 people in the US, and 33,000 people in the EU.

Sustainable alternatives

Having realised the dangerous health implications of excessive antibiotic use, a number of effective, safe, and cost-competitive

Emergence of resistant bacteria can bring about decreased effectiveness to treat human infections.”

alternatives are now being used in place of antibiotic treatments to chart a healthy and profitable future for aquaculture. Moreover, due to the current scarcity of fishmeal, alternative protein sources are being explored extensively.

The following alternatives have so far been successful in yielding positive results:

- Antimicrobial peptides (AMP): diets supplemented with AMP significantly improves growth performance, enzyme activity and disease resistance in aquatic animals, making them promising substitutes for antibiotics in the disease-resistant enhancement of aquaculture applications. Moreover, using yeast products as AMP can effectively replace fish feed, while also acting as an efficient protein source
- Insects as feed ingredients: eight insect species, namely, silkworms, black soldier fly (BSF) larvae, housefly maggots, mealworms, litter beetles, house crickets, banded crickets, and Jamaican field crickets have been used in replacing fishmeal in aquafeeds. A DIL

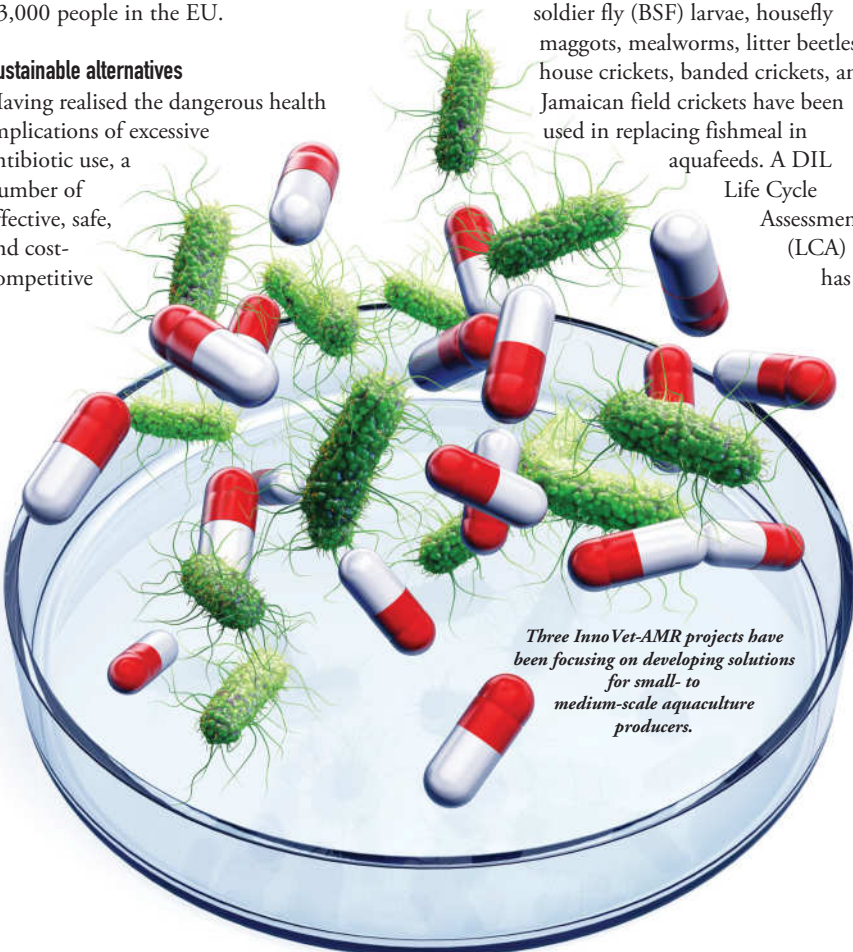
Life Cycle Assessment (LCA) has

also confirmed that products from the insect ingredient company Protix have a considerably lower environmental footprint in comparison with common alternatives. Ittinct, a Rome-based biotech startup has recently announced that it is developing a range of high-performance aquafeeds based on insects, microalgae and agriculture by-products to replace the use of ocean-sourced fishmeal in aquaculture

- Phytobiotics: numerous studies have demonstrated the potential of phytobiotics in activating the innate immune system and stimulating disease resistance of aquaculture species against catastrophic diseases such as Motile Aeromonas Septicemia (MAS). Therefore, phytobiotics are seen as a viable alternative to antibiotics
- Probiotics: using immunomodulators as food supplements is an effective way of strengthening the immunity of animals in aquaculture. A study revealed that the probiotic 'Subtilis-C' containing Bacillus subtilis and Bacillus licheniformis was capable of inducing protein absorption and more intensive consumption of nitrogen metabolites, increasing feed conversion ratio, protein efficiency ratio and digestibility, and effectively controlling bacterial fish diseases
- Immunostimulants: the application of immunostimulants is seen as a promising tool for prophylactic treatment of farmed fish and shrimp. The strength of these compounds appears to lie in their ability to enhance larval culture before the specific immune system matures and the animals can be vaccinated. They are hence able to improve the nonspecific immune function against a broad spectrum of pathogens

In addition to the above alternatives, three Innovative Veterinary Solutions for Antimicrobial Resistance (InnoVet-AMR) projects, with research teams working in Hong Kong, Thailand and Vietnam, have been focusing on developing solutions specifically for small- to medium-scale aquaculture producers.

Solutions such as nanobubbles and quorum quenchers provide alternatives to antimicrobials in farmed fish and shrimp-production systems, which do not create chemical residue in water systems and promote better animal health. Moreover, vaccines also have the potential to protect fish against common bacterial pathogens. ■



Three InnoVet-AMR projects have been focusing on developing solutions for small- to medium-scale aquaculture producers.

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Strategies in place to cure deadly disease in Cavendish bananas

Scientists are vigorously looking for a solution to stop the deadly fungal disease from culling the world's banana population by a quarter.

WITH THE ABILITY to decimate global plantations, Panama disease, also commonly known as banana wilt, has been a threat to Cavendish banana crops since the 1990s. The disease originates in the soil-inhabiting fungus *Fusarium Oxysporum* which can be found wherever susceptible banana cultivars are grown, particularly throughout the Tropics.

Panama disease can have cataclysmic effects on the crop. During the 1950s and 1960s, the commercially-dominating Gros Michel banana fell victim to the fungus due to its inability to build resistance, with farmers having to abandon their crops in favour of the hardened Cavendish banana. Thus far, the Cavendish has avoided the fungal disease, however its lack of genetic diversity leaves it vulnerable to infection from evolving pathogens. One of the biggest concerns scientists are facing is the same threat of extinction for the modern commercial supergiant.

Since the 1990s, a separate strain of the disease, known as Tropical Race (TR) 4, has threatened the Cavendish bananas, and in 2019, the first recorded appearance in the Americas was documented in Columbia. The fungus invades young roots and root bases, before rapidly invading the leaf bases and rootstock. Within a couple of months, the leaves wilt and collapse, covering the crop trunk with dead foliage. Eventually, the entire plant dies, while the fungus continues to thrive in the surrounding soil.

Panama disease has been particularly prevalent throughout Asia. It was initially identified in Taiwan during the 1960s, and

accumulated to such a devastating degree that there was a drastic decline in yield which reached 10% of the previous average. In the 1990s, extreme TR4 epidemics meant hectares of commercial Cavendish cultivars across Indonesia and Malaysia were destroyed, resulting in hundreds of millions of dollars' loss in revenue. The Philippines' US\$400mn banana export market is being threatened as a result of TR4 – the second largest world-supplier after Ecuador.

TR4 has spread exponentially in recent years, now being confirmed in Peninsular Malaysia, Lebanon, Jordan, China, Indonesia, and Australia, as well as Southeast Asia, western Asia, and Africa.

“The Philippines' US\$400mn banana export market is being threatened as a result.”

Curing the spread

Looking ahead, industry experts are using their knowledge to create initiatives and technologies which aim to mitigate the damage Panama disease does to banana crops, as well as preventative measures being

undertaken to stop the disease in its tracks. Firstly, agro-biotech company Rahan Meristem has created a Cavendish banana variant which is resistant to TR4 and doesn't entail genetic engineering. Not only is the variant immune to the disease, but studies have shown that they also boast an increase in banana production early flowering and improved plant architecture.

"TR4 strain of Panama disease is the primary constrain in the banana industry. The fact that our technology can benefit the banana industry in a variety of ways is our major strategic goal. We are working with our partners to salvage the Cavendish banana," said Ron Diner, CEO of Rahan.

In Latin America, the International Atomic Energy Agency (IAEA), alongside the FAO, has trained scientists in using nuclear techniques to detect and contain Panama disease in Cavendish bananas. IAEA's director general, Rafael Mariano Grossi, pledged last year that immediate assistance would be provided in combating the disease and preventing it from devastating a quarter of the global production of the crop. In order to manage this, nuclear techniques will be used for the process of irradiation – exposing an object to radiation. This technique is widely used across the food industry to safely destroy diseases without significantly affecting the food's taste or smell.

Irradiation techniques are being used to fight panama disease in the banana crops for the development of new disease-resistant crop varieties for farmers, in a process known as mutation breeding. The IAEA has trained 12 scientists in this method across regions where the banana disease is rife. The training also covers tissue culture, developing mutant populations and how to screen crops for disease resistance.

Moving away from nuclear techniques, a new study conducted by scientists at the University of Exeter has outlined the hope of finding a cure for the Tropical Race 4 fungus via a particular class of fungicides. A research team has discovered a more specialised class of anti-fungal chemistries not previously used in combating Panama disease which can suppress the infection and maintain banana plant health. This discovery opens many new avenues for scientific exploration in the hopes of combatting the disease once and for all.

Another method being implemented to save Cavendish bananas is the process of grafting, which entails physically binding certain plants together in order to improve the speed of fruiting, hardiness to weather, pest resistance and hybridisation. The technique works by aligning certain internal tissues, vascular cambium, of two separate plants and they'll fuse together, similar to stem cells. This process in the past hasn't been successful with banana plants due to them not harvesting vascular cambium. However, scientists have discovered that instead of fusing the plants, fusing the seeds can have the same effects. Grafting has been used as a solution to Panama disease before, in plants such as cucumbers, watermelons and tomatoes, but the Cavendish banana's adds an extra challenge as they only reproduce through cloning. However, using this new technique could see the revival of the crop.

“The IAEA has trained 12 scientists in mutation breeding, tissue culture, developing mutant populations and how to screen crops for disease resistance.”



Image Credit: Adobe Stock

Panama disease, if left untreated, will lead to the loss of one quarter of the world's Cavendish population.

Countless numbers of research hours have been put into trying to find a strategy in mitigating against the effects Panama disease has on the largest commercial banana crop in the market. Techniques rooted in nuclear technology, fungicides, and alternatively, essential oils made from ginger which manage the fungal biofilms resistance within the disease, are leading the way in making sure the Cavendish banana global supplies are maintained and the risk of extermination is eradicated. ■

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The greener potential for agriculture



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Organic materials used to fertilise soil.

When it comes to choosing between fertilisers, there really is no right or wrong answer. There is, however, the green answer.

THE DECISION BETWEEN organic and chemical fertilisers ultimately comes down to an individual's situation based on time, budget and values. Organic fertilisers come from, as the name suggests, organic sources such as plant and vegetable waste, and animal waste ranging from excreta to animal bones. Because of this, they are readily available and easy to get a hold of. They can even be produced at home without the need for spending money, thus avoiding high costs. Organic fertilisers also naturally break down slower compared to chemical fertilisers, which can become toxic when over-applied and kill plants. The slower fertilisation also means that the nutrients can be absorbed gradually by plants, ensuring they are long-lasting while requiring minimum attention and topping up.

A chemical fertiliser on the other hand, is a synthetic fertiliser which comes from refined organic or artificial substance, where

extracted nutrients are combined with chemical fillers. It is typically made from non-renewable sources like petroleum or broken down rocks. The biggest draw to chemical fertilisers over organic is the price. Chemical fertilisers are inexpensive compared to organic, and also have a longer shelf life. They also work faster than organic fertilisers, yielding results in a matter of days rather than weeks. However, as mentioned earlier, chemical fertilisers can become toxic if not properly managed. They are also not considered particularly friendly to the environment, as they can be dangerous to sea life by causing chemical contamination to nearby waterways.

In the Asia-Pacific region, the use of organic fertilisers has seen rapid growth with a CAGR of 6.3% over the period of 2020-2025. Mordor Intelligence reported that "China accounted for 41.2% of the share in the Asia-Pacific region in 2018," making them one of the key players in adopting organic fertilisers in agriculture among other Asian regions such as Thailand and Vietnam. The Chinese economy is making efforts to move towards greener agricultural practices through the adoption of organic fertilisers over chemical, with a year on year increase of farmers using organic products in support of an eco-friendly future.

On the topic of green agriculture, wood vinegar is also used in organic farming as both a pesticide and fertiliser which improves soil quality to increase crop yield. Wood vinegar is a liquid substance made from heated biomass material such as hardwood chips and sawdust. The biomass is heated while the oxygen supply is eliminated, allowing it to be refined into the liquid substance

In the Asia-Pacific region, the use of organic fertiliser has seen rapid growth."

through carbonisation. There are many benefits to using the product in organic farming, such as developing stronger roots for plants, odour reduction from manure, and improving the overall quality of crops and plants when sprayed onto their leaves.

The benefits of wood vinegar also extend towards animal husbandry, as it can be used as feed supplements in poultry to eliminate salmonella which causes gastrointestinal diseases in chicken. Egg production also saw an increase in tests carried out, with an improvement in taste, quality, and reduced cholesterol content.

Wood vinegar also contains antifungal properties and is being widely used in Asian regions like Japan as a green alternative to synthetic pesticides to combat environmental health related issues. When used in high concentrations, the organic compounds in the wood vinegar's composition can hinder fungi growth for both *Pestalotiopsis* and *Curvularia* species.

Furthermore, a combination of wood vinegar and plasma seed priming can increase the grain yield of winter wheat by up to 40%. "The combination of pyrolygneous acid (wood vinegar) and cold plasma treatment significantly affected the total chlorophyll, intercellular CO₂ concentration, and net photosynthesis rate of winter wheat compared to the control. Previous studies have shown the positive effect of pyrolygneous acid on accelerating somatic embryogenesis, enhancing seed germination, increasing flowering rate, and root biomass. It has also been shown that pyrolygneous acid can increase the growth of roots, stems, tubers, leaves, flowers, and fruits and improves soil fertility," according to *Scientific Reports*.

Of course, bringing the most value to materials goes a long way in green agriculture. To maximise this, pyrolysis equipment like Biogreen equipment can be used. The process involves materials being placed in a high-temperature environment while deprived of oxygen (similar to how wood vinegar is produced). Due to the atmosphere, the materials undergo a molecular transformation through chemical and physical separation. They are then disintegrated by the heat, allowing the development of new molecules which yields products with a different and improved character than the original residue.

The pyrolysis system can come in various types of reactors, with the vertical and fluidised bed reactors being most popular for pyrolysis of renewable materials. The vertical bed reactor is usually most suitable for use with wood, coconut shell and plant-based materials. This system can vary its yield of the pyrolytic product through the heating rate of the system. In contrast to this, a fluidised bed reactor is typically used to produce bio oil products. With this system, a gas or fluid passes through a granulator at a high enough velocity to suspend the solid and cause it to behave like a liquid.

This technology has been used in small-scale experimentations of rice husks in Thailand, the Philippines and Indonesia. Although the experiments were conducted in a lab environment, initial results demonstrated a strong return on investment for the cost-benefit analysis of the system, with figures as high as 73.8% in Indonesia.

“The pyrolysis system can come in various types of reactors, with the vertical and fluidised bed reactors being most popular for pyrolysis of renewable materials.”

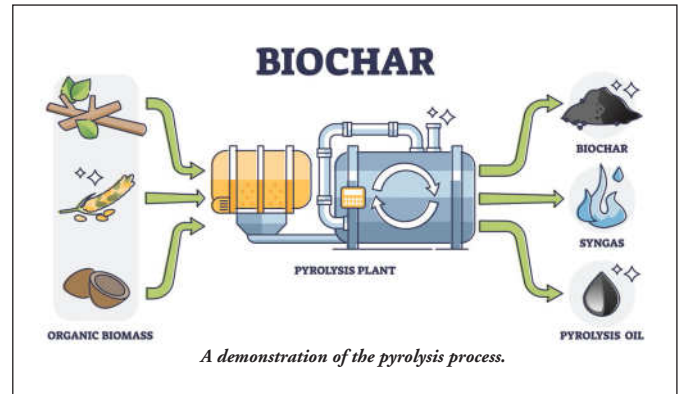


Image Credit: Adobe Stock

Thailand also adopted a pyrolysis system as a way of converting biomass waste into conventional forms of fuel. The small scale of the experiment did not provide a definitive answer, and the high cost of operation does mean that traditional methods are still used across the region.

The Philippines found that the adoption of pyrolysis on risk husks for rice mill production could pay off the initial installation costs of the system in one year.

Ultimately, although more testing needs to be done on a larger scale, initial results look promising. ■

AgroEcoTech: A possible solution to the global food crisis

The urgency to transition from conventional to agroecological farming practices has been felt acutely in the Asia-Pacific region.

WHILE FOOD INSECURITY remains a serious concern in emerging markets and developing countries, an agroecological approach is seen as an effective solution.

According to the IFAD, agroecology is defined as a holistic approach that integrates elements of ecology, economy, and society within a food system, thereby bringing about increased productivity and improved resilience, while also boosting the efficient use of natural resources.

Agroforestry and intercropping are two commonly used agroecological practices that are considered both productive and sustainable. According to a report by the Soil Association, the integration of technology is believed to further accelerate the transition from conventional to agroecological farming practices.

Smart agriculture: Helps with planning, building and maintaining sustainable agroecosystems.

Robotics: Small, lightweight robots have the ability to operate well in heterogenous systems, making them suitable for practices such as strip agriculture and agroforestry.

Genome editing: Improves pest resistance and reduces

farmers' dependence on insecticides, fungicides and herbicides.

Biological controls: Enables retention of healthy ecosystem functionality, while enhancing farmer autonomy.

Remote sensing: Helps in tracking soil water profiles and identifying forms of agriculture best suited for flood risk reduction.

Big data: Improves accuracy of environmental impact tracing, tracking and

Technological integration can accelerate the transition from conventional to agroecological farming practices."

labelling, thereby boosting market demand for sustainable, agroecological produce.

Digital food hubs: Improves viability of small and medium-scale farms and enables transparency across food supply chains, thereby strengthening relationships between farmers and consumers.

Cellular agriculture: Reduces pressure on the food system to produce cheap animal protein, enhances animal welfare and lowers the risk of antibiotic resistance.

Controlled environment agriculture: This includes methods such as hydroponics which helps reinforce localised supply chains and reduce dependence on imports.

The integration of technology can therefore trigger a transition to agricultural simplification, thereby enhancing environmental sustainability and increasing diversity. ■

Agroecology is a sustainable alternative to intensive farming systems.

2023

POULTRY BUYERS' GUIDE

Section One - Supplier listings by categories
 Section Two - List of suppliers
 Section Three - Contact details of agents in Asia

PLEASE MENTION FAR EASTERN AGRICULTURE WHEN CONTACTING YOUR SUPPLIERS

Section 01

All Equipment

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 KSE Process Technology B.V

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Tavsan Poultry Equipment

Cages - broiler

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Section 02



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