

# Far Eastern Agriculture

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## Pest management strategies in cotton crops

**Farm animal health:**  
Innovations to reduce disease

**Aquaculture:**  
The future of fish feed

**Building soil**  
for better crops



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**Poultry  
Buyers' Guide  
2019**

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# Far Eastern Agriculture



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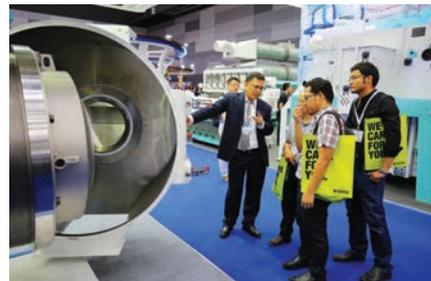
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## Japan and Australia join for fruit production project

JAPAN AND AUSTRALIA have agreed upon a joint plan to harvest high-end fruit all year round, boosting bilateral counter-seasonal production. As reported in the *Nikkei Asian Review*, the two countries are expected to contribute farmland, personnel and technology for this project, aiming to create a unique farming structure.

According to the source, the initiative is set to enable Japanese farmers to cultivate and grow fruits in Australia when Japan is in winter, allowing them to harvest in all seasons. With little time difference, farmers from both countries can monitor each other's farms in real time and provide necessary input to staff on site.

The project is expected to start in Ayr, a northeastern Australian town, where melons will be cultivated and the farmland and greenhouses will be provided by the Australian side. Japan will send private-sector farmers from rural areas to provide technological assistance and train local staff on farming the fruit, said the source. The aim is to explore Japanese farming techniques on an Australian melon species to see if they can achieve the required quality in the fruit.

Both Japan and Australia join ties for a number of agriculture collaborations such as rice, beef and dairy production. The two countries are also coordinating a large-scale shrimp farming project. Japanese Prime Minister Shinzo Abe and his Australian counterpart Scott Morrison further agreed upon a plan to develop new markets for luxury produce, which will be targeted at wealthy consumers in China and Southeast Asia.



*Japan will provide technological assistance and train local Australian staff on farming an Australian melon species.*

## China's import of pork and pig offal set to rise in next five years

WITH THE DEVELOPMENT of China's economy and the improvement of living standards, the pork consumption in China is rising, with the import volume of pork and pig offal expected to grow from 2019-2023, according to the analysis of Research and Markets, a global market research firm.

The Chinese government has strict inspection and quarantine policies on the import of pork products. In November 2018, about 16 countries or regions including the USA, Canada, Brazil, Chile and Mexico were allowed to export pork products to China.

In 2017, the import volume of pork in China was around 1,217,000 tonnes, lower than that in 2016 but higher than that from 2013 to 2015. From 2013 to 2017, the annual imports value of pork in China all exceeded US\$1bn. In 2017, it was US\$2.22bn, lower than that in 2016. The decline was mainly caused by the shrinking import volume.

According to this analysis, China's annual pork consumption is around 55mn tonnes and is growing slowly in recent years. In 2017, pork imports were less than three per cent of pork consumption.

Rising pig breeding costs and stricter environmental policies have forced many small and medium-sized pig farms to close down, and swine fever occurs frequently. These factors discourage the growth of pork output in China. It is expected that from 2019 to 2023, the import volume of pork and pig offal in China will continue to rise, and China's pork market will receive attention from pig farmers and pork traders all over the world.



*China's annual pork consumption is around 55mn tonnes and has been growing slowly in recent years.*

## Africa and Asia take joint global initiative to diversify staples

LEADING AGRICULTURE ORGANISATIONS from Africa and Asia have collaborated on major staples products.

The inaugural meeting and signing of agreements by the largest agriculture associations in Africa and Asia took place on 13 January 2019.

The Asia-Pacific Association of Agricultural Research Institutions (APAARI), Forum for Agricultural Research in Africa (FARA), West and Central African Council for Agricultural Research and Development (CORAF), Food Agriculture and Natural Resources Policy Analysis Network (FANRPAN), along with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) set in motion the Smart Food initiative in 2013.

This partnership is part of a new effort to make a major contribution to the Sustainable Development Goals (SDGs). The approach is to focus on diversifying staples.

"We need to link and synergise other existing programmes along the whole value chain. Capacity building will be one opportunity especially in taking a holistic Smart Food approach where issues around nutrition/health, environment and farmer welfare can be tackled," said Dr Ravi Khetarpal, executive secretary, APAARI.



*Staples can have a pronounced impact on overcoming malnutrition and poverty and coping with climate change. (Image credit: hazel spray/Flickr)*

# Asia-Pacific continues dominance in global feed production



Image credit: Adobe Stock

GLOBAL FEED PRODUCTION is at a record high, according to the 2019 Alltech Global Feed Survey.

The survey estimates a strong three per cent increase to 1.103bn mt of feed produced in 2018, which exceeds the one billion mt mark for the third consecutive year.

The top eight countries are China, the USA, Brazil, Russia, India, Mexico, Spain and Turkey. Together, they produce 55 per cent of the world's feed production and contain 59 per cent of the world's feed mills. Predominant growth came from the layer, broiler and dairy feed sectors, noted the survey.

## Asia-Pacific

The Asia-Pacific region, with China, India and Japan, has accounted for more than 36 per cent of the world's feed tonnage. China is the top feed producer and user with 187.89mn mt. Increased production for Asia-Pacific came from India with 13 per cent due to growth in dairy, layer and broiler feeds. Other countries that demonstrated higher growth variance included Pakistan, Myanmar and Laos.

Globally, broiler production has increased by approximately three per cent in 2018. Southeast Asia's feed production represented more than 20 per cent of the Asia-Pacific region, with Indonesia, Vietnam, the Philippines and Thailand

contributing to 93 per cent of Southeast Asia's feed production.

Pig feed production saw an increase of around one per cent in 2018. The primary producing region for pig feed is Asia-Pacific, but this was also the only region that saw a decline in pig feed production as Mongolia, Vietnam, China, New Zealand and Japan experienced decreases. Europe saw the largest growth at approximately 2.2mn mt. Russia and Spain accounted for the majority, while Finland, Denmark, France and Poland also contributed.

Overall, aquaculture feed has showed four per cent growth in 2018. This was primarily attributed to strong increases in the Asia-Pacific and European regions. The traditional Asia-Pacific leaders in aquaculture such as Vietnam, India and Indonesia, combined for an additional 1.58mn mt of feed in the region. China saw an increase of one per cent over last year.

The pet food sector saw growth of approximately one per cent, primarily attributed to an increase in the Asia-Pacific region, which was offset by a decrease in the Latin American and African regions. In previous surveys, Europe had been the top-producing region for pet food production, but after a reassessment of 2017 numbers and despite growth of two per cent, it ranks just behind North America.

## EVENTS 2019

### FEBRUARY

13-16

#### Seafood and Fisheries Emerging Technologies Conference

Bangkok, Thailand

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

26-27

#### VAFSA 2019

Bangkok, Thailand

[www.integer-research.com/conferences/vafsa-2019](http://www.integer-research.com/conferences/vafsa-2019)

### MARCH

13-15

#### VIV Asia 2019

Bangkok, Thailand

[www.vivasia.nl](http://www.vivasia.nl)

27-30

#### Poultry & Livestock Bangladesh

Dhaka, Bangladesh

[www.cems-foodagro.com/poultrybd](http://www.cems-foodagro.com/poultrybd)

### APRIL

8-12

#### 12AFAP

Iloilo City, Philippines

[www.12afaf.net](http://www.12afaf.net)

### MAY

16-17

#### Dairy Asia 2019

Jakarta, Indonesia

[www.szwgroup.com/global-dairy-congress-asia-2019](http://www.szwgroup.com/global-dairy-congress-asia-2019)

### JULY

3-5

#### Indo Livestock 2019

Surabaya, Indonesia

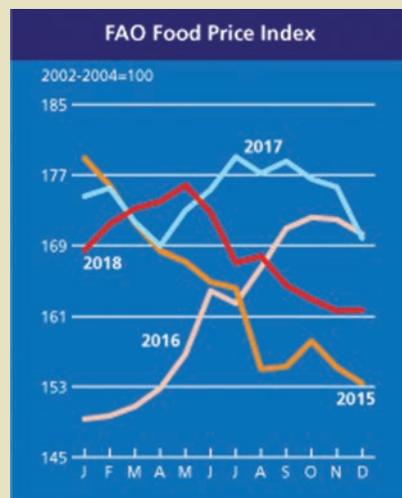
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# FOOD OUTLOOK

THE FAO FOOD Price Index\* (FFPI) averaged 161.7 points in December 2018, nearly unchanged from its November value as lower dairy and sugar quotations were largely offset by firmer cereal prices and somewhat higher prices of meat and oils. For the whole of 2018, the FFPI averaged 168.4 points, down 3.5 per cent from 2017 and almost 27 per cent below the highest level of 230 points reached in 2011.

The FAO Cereal Price Index averaged 167.1 points in December, 3.0 points higher than in November and 9.6 per cent above December 2017. Wheat prices were up slightly in December, mostly supported by harvesting concerns in Argentina due to untimely rains and tightening export supplies in the Russian Federation. However, strong competition for exports limited the rise in prices. International maize prices also rose in December, amid firm global demand coupled with weather concerns in the southern hemisphere.

The FAO Vegetable Oil Price Index averaged 125.8 points in December, posting a marginal increase of 0.5 points from the previous month and marking the first rebound after ten consecutive falls. The slight recovery was driven by higher palm oil prices, which reflect both rising domestic demand in major producing



countries and firmer global import demand. By contrast, international soy and rapeseed oil prices continued to drift downward on account, respectively, of ample supplies in the USA and weak demand in the EU.

The FAO Meat Price Index averaged 163.6 points in December, 1.3 points higher than its slightly revised value for November. While poultry and bovine meat prices changed only a little in December, international price quotations for ovine meat fell slightly, mostly as a result of increased export supplies from Oceania. By contrast, pigmeat prices

partially recovered, supported by strong global import demand, especially from Brazil. In 2018, the Index averaged 166.4 points, down 2.2 per cent from 2017.

The FAO Dairy Price Index averaged 170 points in December, down 5.9 points from November, marking the seventh successive month of decrease. In December, international price quotations for butter, cheese and Whole Milk Powder (WMP) declined, underpinned by increased availability of export supplies, especially from New Zealand. However, Skim Milk Powder (SMP) prices increased marginally on stronger world import demand.

The FAO Sugar Price Index averaged 179.6 points in December, down 3.6 points from November. International sugar prices fell under renewed downward pressure, in part because of reportedly faster growth in sugar production in India in recent months. Falling international prices of crude oil also contributed to the slide in sugar quotations, as lower energy prices tend to reduce the use of sugarcane to produce ethanol, resulting in more supplies for the production of sugar, notably in Brazil, the world's largest sugar producer. Overall for 2018, the Index fell by almost 22 per cent year-on-year, underpinned by ample world production and accumulating inventories.

## Evaluation of smart farming devices for better output

AS INNOVATIVE TECHNOLOGIES paved the way for smart farming's emergence in the internet of things (IoT) landscape, LPWAN supplies a range of features in terms of energy consumption and long-range transmission.

In 2025, there will be around 40mn smart farming devices in use worldwide, including growing and livestock apps and apps for farm equipment. Asia-Pacific is expected to be the market leader for the period running from 2018 to 2025.

These technologies offer multiple benefits in the area of farming, especially for the growing and livestock markets. Equipment and machinery can also benefit from broadband technologies that will help meet their data transmission and mobility needs.

Adoption levels for smart farming solutions are still quite low. This can be attributed in particular to financial barriers as these solutions remain unaffordable to the average farmer.

The market itself is populated chiefly by veteran farming industry players, such as machinists, farming equipment suppliers, traditional farming solution providers and new agritech start-ups.

## Advancing cellulosic biofuel from agricultural residues

EXXONMOBIL AND RENEWABLE Energy Group (REG) have signed a joint research agreement with Clariant to evaluate the potential use of cellulosic sugars from sources such as agricultural waste and residues to produce biofuel, which has the potential to play a role in reducing greenhouse gas emissions.

The new partnership expands a previously announced agreement for joint research between ExxonMobil and REG, in which the companies successfully validated the ability of REG Life Sciences bio-conversion technology to convert sugars from cellulosic biomass into biodiesel through a single-step process.

The new agreement aims to further optimise REG's bio-conversion process using cellulosic sugars created through Clariant's sunliquid® process.



The goal is to evaluate the potential use of cellulosic sugars from sources such as agricultural waste.

Image credit: Adobe Stock

## KUHN displays wide range of farm machinery solutions at LAMMA 2019

GLOBAL AGRICULTURAL MACHINERY manufacturer KUHN Farm Machinery has showcased a wide range of sprayer, baler, baler-wrapper and feed wagon ranges, as well as a selection of fertiliser spreaders, cultivation equipment and seed drills at LAMMA 2019 in Birmingham from 8-9 January 2019.

The company displayed the MERGE MAXX 950 that uses two adjustable, variable width and bi-directional merger belts to give a maximum grass pick-up width of 9.50 metres. The bi-directional design of the MERGE MAXX 950's twin belts aim to provide multiple windrow delivery options. Forage can be delivered into a single central windrow, a single lateral windrow (left or right side), two lateral windrows (one either side) or a central and left or right lateral windrow.

The MAXIMA 3, the new generation precision seed drill, was on display during the show. It uses an improved seed selection and ejection system which enables accurate seed placement at working speeds of up to 10km per hour. Accuracy is enhanced by a new seeding unit parallelogram which is reinforced in important areas, including at critical hinges and linkages, for added stability, robustness and longevity, according to KUHN.

The company further displayed the OCEANIS 7702 crop sprayer. According to the company, the new sprayers are fully ISOBUS compatible, enabling them to be controlled from a single in-cab terminal such as KUHN's CCI 1200 console.

The OPTIMER XL range of stubble cultivators consists of mounted and trailed machines were on display at LAMMA.



Image credit: KUHN

MERGE MAXX 950 – bi-directional belt merger.

KUHN said, “Each disc is mounted on four elastomer blocks which enable them to move independently over obstacles, thereby maintaining an even working depth across the machine’s full width, even when working in very stony conditions. Adjustable soil retaining discs which can be angled 14° to the front or 14° rearwards and by up to 12° vertically prevent soil being thrown out of the cultivated strip and maintain level and consistent seedbed preparation.”

## Case IH upgrades Austoft 8000 Series for sugarcane cultivation

CASE IH HAS expanded its product offerings upgrading its last Austoft Series with two new models such as the 8010 and 8810 single-row and multi-row sugarcane harvesters.

The new Austoft models combine the technologies from its predecessors and the most advanced solutions to the sugarcane harvesting sector to create a machine that offers easier operation, improved harvest quality and increased productivity.

The Austoft 8010 and 8810 sugarcane harvesters, with a raft of new features and improvements, were introduced in Australia in 2018 after 18,000 hours of testing on the field. The two models are now available worldwide.

Michele Monzio, sugarcane harvester product manager APAC at Case IH, commented, “The new Austoft 8010 and 8810 models further extend our product offering, meeting an increasing demand for innovation in the sugarcane harvesting industry. We are confident sugarcane growers will appreciate the improvements in these new machines which will lead to more profit for the farmers and increased output for sugar mills.”

Among the new features are LED work



Image credit: Case IH

Case IH Austoft 8010 sugarcane harvester

lights, a raised cab position for better operator visibility which doesn't add to the overall height of the harvester and new rearview mirrors, footrests and operator seat to improve driver comfort.

### World-class sugarcane harvesters

The new Austoft 8010 and 8810 models are the latest arrivals in the Case IH product family. The Austoft Series has a long history of advances in cane-harvesting technology, promoting excellent cane quality and ultra-clean samples. It has a solid reputation for its advanced solutions, performance and high levels of customer satisfaction.

With this release, Case IH now offers a full range of harvesting equipment for all sugarcane varieties and growing conditions in the world. Today, Case IH's sugarcane harvesting solutions are:

- **The Austoft 4000 Series:** specifically designed for small to medium landholdings or big plantations with reduced row spacing. This harvester is a superb option for sugarcane fields with reduced spacings of 1.0 and 1.1 metres, and for those cane growers who need or wish to start harvesting mechanically, or for big plantation areas where the Austoft 4000 can harvest short rows or low productivity soils.
- **The Austoft 8000 Series:** capable of harvesting up to 100 tonnes per hour. Its output and the cleanness of the sugarcane billets delivered to the mill enable the exceptionally efficient production of high-quality sugar. The high performance and reduced cane loss are due to a combination of factors: a powerful yet efficient engine, industry-leading cutter, chopper and extractor design, and operator-friendly features that make driving easier and more precise.

# VIV Asia 2019: Feed, food and animal health in focus

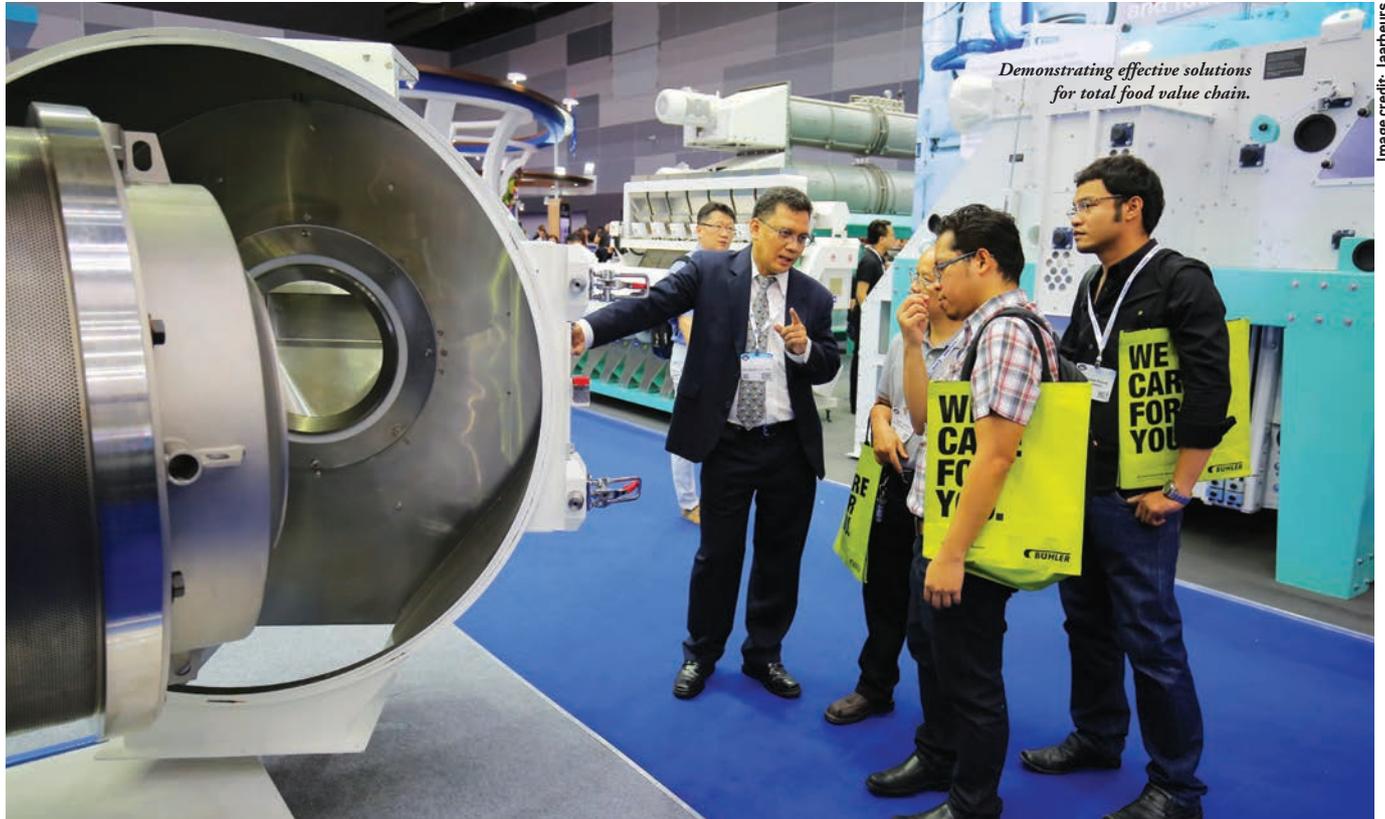


Image credit: Jaarbeurs

## Asia's leading feed to food international trade show returns in March 2019.

**VIV ASIA 2019** takes place from 13-15 March 2019 at the big Bangkok International Trade & Exhibition Centre (BITEC) exhibition centre in Bangkok, featuring Asia's outstanding feed-to-food event that covers all species and every part of the animal protein value chain such as processing of poultry and eggs, red meat, fish and dairy products.

Organised by VNU Exhibitions Europe, a daughter company of the Dutch trade show organiser Jaarbeurs, and VNU Exhibitions Asia Pacific, a subsidiary company located in Bangkok, around 1,250 exhibitors from 60 countries are expected to attend the show including global and regional market leaders as well as national

Asian players of growing importance, displaying the latest products and services for all animal protein producers and processors.

## “The complete food chain – poultry and eggs, red meat, fish and dairy products.”

### New business opportunities

VIV Asia 2019 is a platform where animal protein industry executives from throughout the Asian region will meet the experienced and reliable suppliers they need for their business. The visitors will be representing forward-thinking businesses active in the sectors of meat, eggs, milk and aquaculture.

The leaders of many of Asia's most prominent food companies as well as

directors and managers of animal protein production and processing operations will benefit from VIV Industry Leaders priority treatment.

### Showcasing innovative products

VIV Asia 2019 will be showcasing new innovative products. Linzhou Animore will showcase new feed additive NCG, Vetpharma will present new bovine respiratory disease management solution and Keminto will display Clostat as a solution for antibiotics in swine.

Recently, ZhengChang announced installing equipment to produce livestock and poultry feeds in Bangladesh. Dinnissen covers its cloud-based Productivity Platform. Delacon refers to consumer surveys of plant-based feed additives.

The conference will be focussing on a wide range of sectors including feedmill, feed ingredients and additives

manufacturers, animal health manufacturers and distributors, veterinarians, nutritionists, breeders, farm owners and farm employees, animal industry equipment manufacturers as well as distributors, processing companies, food retailers, marketing and sales managers, importers and exporters, researchers and consultants, media and associations, engineers and technicians and many others.

**Across the animal protein spectrum**

A high-tech animal health conference will focus on pig health and advanced pig farming sessions and an aquafeed extrusion short course.

The programme will also focus on emerging poultry trends. A meeting will be held by the World Veterinary Poultry Association with its Thailand branch, describing poultry meat as ‘the value protein for one’s health.’ Moreover, the pet-sector interest of VIV Asia visitors has prompted a conference dedicated to pet animal health and nutrition.

Asian Food & Tech Trends will focus on the food engineering aspect of the exhibition. In addition, there will be conferences on feed management for dairy cows in a tropical zone and strategies to replace antibiotic growth promoters.

A VIV Asia Special, the aqua world gets bigger at the show and includes both an attractive Aquatic pavilion and conferences such as Aquatic Asia and Aqua Feed Extrusion. Aquatic Asia 2019 will describe challenges and opportunities in the aquaculture sector featuring Asian feed and food safety. A meeting by the Federation of Asian Veterinary Associations (FAVA) is set to cover antimicrobial resistance ‘from science to policy.’

During the show, DairyTech will focus on profitable dairy production, with a dedicated pavilion and a special series of content programmes, seminars and exhibitors. A Dairytech programme is “The challenging of dairy feed management for good milk quality of dairy cattle in tropical zone.”

Pet health and nutrition is a VIV Asia Special within the VIV Asia content offer, consisting of a conference programme organised by VIV and partners. The session will discuss trends in pet food and pet health, food safe pet food factory design, nutritional management of gastrointestinal diseases, pet food and hypersensitivity etc.

Event manager Zhenja Antochin declared, “The pre-show promotion



Image source: Jaarbeurs

campaigns for VIV Asia 2019 are targeting a number of crucial countries in the wider Asia-Pacific region including China, India, Pakistan, Bangladesh, Japan and of course Thailand. We are organising important delegations from each of these countries and others as well, representing their most forward-thinking businesses active in the sectors of meat, eggs, milk and aquaculture.”

**Around 1,250 exhibitors from 60 countries are set to attend the show.”**

**Special side events**

VIV Asia 2019 offers a wide range of side events in venues close to BITEC.

Positive Action Publications will present Broiler Breeder 2019 in the Hilton Sukhumvit in Bangkok on 12 March. The conference will focus some of the major topical management and disease issues that impact the bottom line in modern, intensive broiler breeder production in Asia.

Pig Health 2019 will look at some of the important topical management and disease issues associated with changes that impact modern pig production in Asia on 15 March. Mycotoxins 2019, on 12 March, will look at managing this major health and productivity threat across the Asia-Pacific region.

“We expect more than 50,000 visits in March 2019,” Antochin noted. “Past editions have achieved the highest approval ratings from visitors and exhibitors of any

event organised by VIV worldwide.”

“We are determined that the March 2019 show will confirm that degree of value and satisfaction for everyone concerned and the key role we play in serving industry leaders from all parts of Asia and beyond. Our job is to make sure that the event has excellent and specific features to suit all visitors and that everyone in the feed-to-food chain is aware of the value of visiting,” Antochin added.

Some of the exhibitors include Metro exporters, Veterinary Medicine Company – TRAVETCO, A&S Thai Works Co, Ltd, Aviagen Group, BASF (Thai) Limited, BMC Groupe, BIC Chemical Co, Ltd, CCPA GROUP, CEVA Polchem Private Limited, ADM Protexin Limited, Zhejiang Vega Bio-technology Co, Ltd, Vetracare, Socorex Isba SA, THESEO, Prosol SPA, Range Pharma Malaysia, Rensin Chemicals Limited and many others.

**6th GFFC by IFIF preceding VIV Asia**

VIV Asia 2019 is a central point of a feed-to-food week in Bangkok. The week begins with the 6th Global Feed and Food Congress at the city’s Shangri-La Hotel before VIV Asia starts at BITEC. A number of other business meetings will also be held in the city by media partners and companies at various locations in the same week.

The aim is to strengthen Bangkok’s international position as a global business hub, providing a platform to connect people from around the world to expand business opportunities. ■

*The online pre-registration is available on [www.vivasia.nl](http://www.vivasia.nl)*

# What's new in tillage innovations?



Image credit: Adobe Stock

*Tillage systems create ideal soil conditions for seed germination and crop establishment.*

## Modern tillage solutions lead to sustainable soil management techniques, with less erosion, less crusting and less energy use, crucial for yielding better crops

**T**HE SUCCESS OF today's farming highly laid on the development of modern-day agricultural equipment and machineries. Farm mechanisation reduces the drudgery associated with traditional farming methods, contributes to increased land productivity, enhances timely preparation of land and reduces cost of production.

As tractors are one of the major agriculture equipments used globally, different types of implements are attached to tractors during various phases of farming, which efficiently reduces the production cost and time.

The demand for tractor-mount equipment has been increasing globally. According to ResearchAndMarkets analysis, the global tractor implements market (tillage, irrigation and crop protection, sowing and planting, harvesting and threshing) is projected to reach US\$76.1bn by 2023, from US\$57.3bn in 2018, at a CAGR of 5.84 per cent.

### Soils for better crops

Tillage is the agricultural preparation of soil by mechanical agitation of various types, such as digging, stirring and overturning. Tillage has been used for millennia to prepare the soil prior to sowing many of the annual grain crops. It involves applying power to break up and rearrange the entire topsoil structure. According to the UN Food and Agriculture Organisation (FAO), tillage system primarily aims to destroy weeds and pests in the fields and is also important for incorporating, redistributing or releasing nutrients and making the soil texture suitable for seed sowing, seed germination and for easy penetration of seedling roots.

As defined by the International Rice Research Institute (IRRI), tillage is normally classified as primary or secondary tillage. Primary tillage is generally conducted when the soil is wet enough to allow ploughing and reasonable levels of traction. This procedure normally occurs

just after the crop harvest or at the beginning of the next wet season when there is sufficient power available some soil types are ploughed dry. It further set to ensure soil aeration and water accumulation, based on the soil type and dynamics.

Secondary tillage is implemented after primary tillage completes it works and aims to reduce clod size, weed control, incorporation of fertilisers, levelling soil surface etc.

### Full-field tillage

"A full-field system manages the soil uniformly across the entire field surface. Such conventional tillage systems typically involve a primary pass with a heavy tillage

**Tillage systems create a uniform and often finely aggregated seedbed over the entire surface of the field."**

tool to loosen the soil and incorporate materials at the surface (fertilisers, amendments, weeds, etc), followed by one or more secondary passes to create a suitable seedbed.” (Excerpted with permission from “Building Soils for Better Crops,” published by Sustainable Agriculture Research and Education (SARE) Outreach, USDA - National Institute of Food and Agriculture (NIFA). Citation of SARE materials does not constitute SARE’s or USDA’s endorsement of any product, organisation, view or opinion. For more information about SARE and sustainable agriculture, see [www.sare.org](http://www.sare.org))

According to SARE programme, apart from incorporating surface residue, full-field tillage systems crush the natural soil aggregates, preventing surface sealing, erosion, hard crusts that often restrict root growth.

“Compacted soils tend to till up cloddy and intensive harrowing and packing are then seen as necessary to create a good seedbed. This additional tillage creates a vicious cycle of further soil degradation and intensive tillage. Secondary tillage often can be reduced through the use of modern conservation planters, which create a finely aggregated zone around the seed without requiring the entire soil width to be pulverised,” noted the publication.

“A fringe benefit of reduced secondary tillage is that rougher soil often has much higher water infiltration rates and reduces problems with settling and hardsetting after rains. Weed seed germination is also generally reduced, but pre-emergence herbicides tend to be less effective than with smooth seedbeds. Reducing secondary tillage may, therefore, require greater emphasis on post-emergence weed control,” SARE publication further added.



Commercial silos for grain storage.

Image credit: Adobe Stock

### Food grain storage

Grains such as rice, maize, wheat, gram and pulses are major export earners for a number of countries in Asia-Pacific. Therefore, cutting-edge grain processing operations are undertaken to add value to agricultural materials after their production.

“One of the most critical physiological factors in successful grain storage is the moisture content of the crop. High

moisture content leads to storage problems because it encourages fungal and insect problems, respiration and germination.”

“The storage of grains can also be affected by the atmosphere, in addition to temperature and moisture content. If damp grain is held in a sealed container, the respiration of grain and insects will consume the available oxygen. As the oxygen is depleted, it is replaced with carbon dioxide. This, in turn, inhibits the activity of the insects and fungal problems, which will decrease to the point that it virtually ceases.”

The oven-drying method, rapid-oven method, salt-jar method, moisture meters are used some of the references for moisture content measurements of the crops. In addition to this, various easy-to-use electronic metres are used as credible measurement techniques. ■

### Requirements for safe storage

- Prevent damp (moisture) from the floor and walls reaching the produce by stacking the bags on pallets off the ground and away from the walls
- Stack the bags properly to allow optimal use of space
- Make sure the building is rodent-proof.



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# Innovations changing animal health



*Recent technological innovations significantly reduce health risks in livestock production.*

Image credit: Dario Sabajak/Adobe Stock

**The modern animal health industry involves adopting new technological innovation to cut down disease outbreak, enhance quality production and ensure global food safety.**

**IN THE CURRENT** globalisation era, animal health measures are critical to feed the growing global population, increase productivity of livestock, facilitate international trade of animals and animal products and avoid unnecessary trade barriers.

In light of this, advancements in animal health improvements will not only promote greater attention to animal welfare but also provide long-term sustainability and ensure food safety that are very much dependent on the resources allocated to animal health.

According to the HealthforAnimals industry survey, the animal health sector plays a significant role in controlling diseases in the human population. “One Health initiatives involving networks of stakeholders can provide a strong boost to collaboration between animal and human health,” said the survey.

The modern animal health industry has experienced a continuous flow of innovation in the last 20-30 years. The agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) encourages the members of the World Trade Organisation (WTO) to base their sanitary measures on international standards and guidelines, setting the basic rules for food safety and animal and plant health standards.

## Emphasising the channels

In fostering deeper collaboration, the animal health sector needs to explain and emphasise the channels through which animal health

affects human health.

Regulatory streamlining for vaccine technology can be linked to broader inefficiency and a lack of transparency in government procurement of vaccines. However, regulatory barriers can often be overcome rapidly in times of emergency.

There is potential for cooperation in the area of vaccine technology. Risks and costs, as well as data, can be shared by working together with each other, and with research institutes and the public sector. “This would permit quicker development of vaccines and better use of overall available funding. However, cooperation needs to be structured in such a way that companies can make a return on their investment,” pointed the survey.

To address the pet health innovations, the World Organisation for Animal Health (OIE), a WTO reference organisation for standards relating to animal health and zoonoses, has developed a new concept that creates virtual rolling stocks: suppliers produce the vaccines only when needed, or they remain with the suppliers at their own risk and are renewed on a rolling basis under terms and conditions contractually defined with the OIE.

## Disease management

Given the statistics that the global population is likely to reach about 9.7bn by 2050, the HealthforAnimals Survey suggests that ‘the global food supply’ will be the third-biggest challenge facing the animal health sector over the next five years, after antibiotic resistance and infectious diseases.

HealthforAnimals, in collaboration with Oxford Analytica and the Gates Foundation, has published a report entitled “The growing threat of vector-borne disease in humans and animals,” which

highlighted that sustainable disease management involves accepting that the aim of eliminating pathogens is likely to be unrealistic and that a more sophisticated, multi-pronged approach is needed.

“Especially in emerging markets, improvement of basic husbandry practices can mean a significant contribution in this field. There should be a change in the emphasis on disease management, from pathogen-eradication to management for the development of long-term, sustainable health. This should include animal breeding for disease resilience, which has the potential to improve animal health, welfare and productivity,” according to HealthforAnimals.

Image credit: Eugene Chernetsov/Adobe Stock



Veterinarian with farm cattle.

### International standards

The OIE International Standards sets out standards for the improvement of animal health and welfare and veterinary public health worldwide, and for safe international trade in animals and their products. The health measures in the International Standards are to be used by the Veterinary Authorities of importing and exporting countries for early detection, reporting and control of agents pathogenic to terrestrial animals and, in the case of zoonoses, for humans, and to prevent their transfer via international trade of animal and their products, while avoiding unjustified sanitary barriers to trade.

The OIE has published two codes (Terrestrial and Aquatic) and two manuals (Terrestrial and Aquatic) as the principle reference for WTO members, which aim to assure the sanitary safety of international trade in terrestrial animals and aquatic animals and their products.

In recent years, the codes are further expanded to cover animal welfare and animal production food safety, consistent with the expanded mandate of the OIE which is ‘to improve animal health worldwide.’

### Innovations in pet health

As the animal health sector plays a bigger role in the control of diseases in the human population, according to the HealthforAnimals Industry Survey, governments are required to increase their support for animal health as part of a broader human health policy.

According to the survey, there are diverse opportunities for the veterinary health sector to adopt new technologies. For example, data generated in veterinary clinics can be uploaded to the internet, for sharing with other clinics and researchers. This can permit real-time analysis of changes in prevalence of diseases.

Also, real-time communication between vets and owners about pet health issues using mobile online technology is an important growth area. The vets can send reminders to owners about the dates for vaccines or medication refills, or provide instructions for pets’ diets.

In emerging markets, animal medicines may be locally unavailable; those that are available may be beyond the resources of local producers or may only be available in pack sizes that are inappropriate for small-scale producers.

Therefore, small-scale, mobile refrigeration capacities are needed to overcome these challenges. Testing also often needs to be conducted outside laboratories, in remote locations. To address these, more point-of-care equipments are needed that are lightweight, cheap and can be used to conduct basic tests or provide vaccines or treatment.

One important area where innovative developments may be within reach of small-scale, resource-poor farmer is through mobile telephony, where inexpensive technology can be used more to provide farmers with knowledge and practical diagnostic assistance.

Vaccination has been one of the leading innovations within the animal health sector over the past 100 years. Many developing country governments are taking the initiative to make much use of animal vaccine to address livestock health issues.

“Developments in mobile phone technology and software could be used, for example, to automate remote faecal egg counts or FAMACHA anaemia scores, leading to better targeted treatment. Mobile penetration rates are rising almost everywhere, and several large emerging markets already have rates that are at least as high as in the OECD,” noted the survey. ■

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# Cotton – pinpoint insect pests before spraying



Image credit: Micron Sprayers

*Cotton bollworm is the single most damaging pest of cotton worldwide.*

**Dr Terry Mabbett evaluates the impact of integrated pest management in cotton production.**

**C**OTTON IS BOMBARDED with insect pests from seedling emergence through to picking, arriving and infesting in sequence from when the cotyledons (first leaves) push through the soil. And from there on and into the early stage (first six weeks) of vegetative growth; from 45 days after sowing when flower buds (squares) begin to form; and through flowering, boll formation and boll maturation. But insect pest problems for cotton farmers are not yet over because as ripe bolls split to expose the snow-white lint, insect pests and associated fungal moulds stain and soil the fibres.

Cotton farmers must be forewarned and well-armed against insect pests because failure to spray insecticide at the appropriate time can lead to a complete loss of crop, and eventually force farmers to grow easier but less lucrative crop options like sugar cane. However, insecticide spraying week in and week out throughout the life of the crop will invariably cause different but equally serious and escalating problems. Insect populations eventually 'recover' from the effects of insecticide and can 'bite back' with 'vengeance.' Now freed from any

worthwhile natural control by predators and parasites (obliterated by spraying), and often insensitive (resistant) to insecticide action, insect pests will essentially have a free hand.

The answer lies in sustainable spraying. This is achieved by using application techniques, insecticides, doses and schedules that provide long term economic control without antagonising insect pest populations into even greater economic damage. Central to the strategy is a thorough knowledge of the major insect pests of cotton including identification and knowledge of the different developmental stages – what they look like and when and where to find them on the cotton plant.

**“ Sustainable pest management is crucial to protect against yield loss and damage of cotton fibre quality.”**

Ability to quantify pest populations by counting individual insects on a representative sample of plants will allow farmers to carry out

decision-led spraying whereby cotton is only treated with insecticide when pest counts arrived at by scouting on a weekly basis exceed a pre-determined economic damage threshold.

Such thresholds are expressed as insects/plant or insects/leaf. Though clearly specific for different insect pests, they are essentially economic in nature and will therefore vary with a number of factors including size of farm, level of inputs, subsidies and market price of cotton lint. Scouting techniques and spraying thresholds are formulated by scientists and extension workers and provided for farmers in the locality where the research was conducted.

This article offers an insight into the groundwork underpinning the mechanics of sustainable spraying, by looking at the ecology of a relatively small group of mainstream cotton pests. These comprise three sucking pests – cotton aphid (*Aphis gossypii*), cotton jassid or leafhopper (*Amrasca devastans*), cotton whitefly (*Bemisia tabaci*) and the cotton bollworm (*Helicoverpa armigera*).

### Sucking pests

As the cotyledons of newly germinated cotton seeds push through the soil surface they will become immediate targets for sap sucking bugs including whitefly, aphids and jassids. Having cleared away all the debris and ratoon cotton from last year's crop, farmers will be dismayed and amazed to find new plants infested so early in the season. But a quick inspection of a wide variety of weeds growing around the cotton field will tell him/her why this is so. These sucking pests are completely polyphagous, feeding and breeding on scores of different weeds and crops from many different plant families. This is not the time to consider thresholds. Just one or two insects feeding on such small and vulnerable plants are enough to kill. These plants require spraying as soon as insect pests are seen.

But once established and with the rains on time, cotton plants should 'get away' and start on a rapid vegetative growth stage lasting about six to seven weeks. Sucking pests will build up but if the plants are growing rapidly they may be able to withstand a not inconsiderable infestation. Plants should be inspected regularly and at least once a week.

If looking for jassids, inspect the undersides of the leaves, especially those at the fully expanded but not yet hardened stage of growth and development. These are the leaves offering the most attractive carbon:nitrogen ratios for jassids and thus where these sucking insects will congregate. Counts of jassids should comprise and include the adult and nymph stages.

**“Sucking pests are completely polyphagous, feeding and breeding on scores of different weeds and crops from many different plant families.”**

Spray application method should take into account the under-leaf and mid canopy location of jassids by spraying up and under the foliar canopy. This may be especially important if applying a contact insecticide by lever operated knapsack sprayer. Shoulder-mounted mistblowers will overcome any spray coverage problems by opening up the canopy to droplet penetration and deposition. Jassids are known to run around on the upper leaf surface during the hours of darkness where they will pick up contact insecticide sprayed during

the day. Thus, under-leaf spray deposition may not be as important as it would first appear.

However, good under-leaf spray coverage is crucial for control of whiteflies. The lower (abaxial) surface of the leaf is where the adult fly feeds and lays eggs, and where the sessile, scale-like larvae feed and pupate. Adults are the most easily seen and identified stage but are also the most difficult to count accurately because they are so mobile. The larvae, though more difficult to see, are sessile and sedentary. This means that they are more conducive to accurate counting and also give a more meaningful assessment of feeding damage to the mid-canopy leaves where they are mostly found. Scouting methods for cotton whitefly generally count the larvae with or without a hand lens depending on eyesight.

Aphids are unique because they tend to exist in colonies on either the very young or very old foliage. These are the plant parts with the highest concentration of soluble nutrients. For practical purposes scouting should involve the counting of colonies rather than individuals. Be that as it may, cotton aphids can carry and transit a number of lethal plant viruses, which means farmers may prefer to spray at first appearance of aphids rather than waiting for a higher threshold to be breached.

### Cotton bollworm

Cotton is attacked by a range bollworms including pink bollworm

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(*Pectinophora gossypiella*) and spotted/spiny bollworms (*Earias sp*), but the cotton bollworm (*Helicoverpa armigera*) is the most widespread and damaging of these bollworm pests. *Helicoverpa armigera* moths are the strongest fliers and the larvae feed on a wider range of plants (crops and weeds) than can other bollworms, a factor which has contributed to the development insecticide resistance within populations of this pest.

Like other bollworms, *Helicoverpa armigera* is a pest of the reproductive phase of cotton (45 days from planting onwards), attacking flower buds (squares), open flowers and bolls at all stages of development. Adult female moths lay eggs on leaves, stems and squares (flower buds) and later in the season on open flowers and bolls. The small and delicate first instar larvae hatching from the egg stage feed on very young leaves. They grow and develop rapidly through four or five instar stages, and progressing in diet from young leaves and flower buds to flowers and bolls. As they develop through the instar stages the larvae move down the plant and deeper into the canopy from an exposed position on the branch tips where they hatched from eggs laid on the youngest leaves and flower buds.

First and second instar larvae are the logical targets for any spray programme because their low mass (weight) and exposed position makes them easiest to kill. Scouting programmes are therefore based on counts of these larval stages. That said the best insect stage to use in a scouting programme, and on which to base economic thresholds, is the egg stage to give farmers more time (several extra days) to organise spraying after scouting, and still 'catch' the first/second larval instar stage with insecticide.

The small eggs can be seen with the naked eye and counted although heavy rainstorms occurring soon after scouting may wash large numbers of eggs from the plant. In addition, there may be heavy populations of *Trichogramma* wasps and other similar natural enemies which are parasitising of the normally white egg of the cotton bollworm. Parasitised eggs are not white but discoloured with brown. Both of these factors should be taken into account when deciding on a final economic threshold level expressed as the number of viable bollworm eggs per cotton plant.

Another factor to consider is that female

**Shoulder-mounted mistblowers can overcome any spray coverage problems by opening up the canopy to droplet penetration and deposition."**

moths preferentially lay their eggs on the tallest and healthiest looking plants in the field. Farmers must therefore use a 'random' method of selecting plants for counting eggs and larvae (e.g. every tenth plant across diagonals from corner to corner of the field). If the farmer chooses plants according to his or her 'fancy' he or she will invariably go for the tallest, bushiest and greenest plants, just like the female moth, and therefore obtain an egg count which is unrepresentatively high for the cotton field as a whole.

Controlled Droplet Application (CDA) using spinning disk sprayers has proved particularly appropriate for control of the cotton bollworm. Small, uniform-size droplets produced by the spinning disk and 'drifted' into the canopy are selected out by the growing tips of the cotton plant, where the vulnerable first and second instar larvae feed.

#### End of season damage

A classic end of season insect pest is the cotton stainer (*Dysdercus sp*) which as the name suggests causes a yellow/brown staining of the white cotton lint and thus reducing its marketable value. However, even greater damage can be done by late season attacks of aphids and whiteflies because both of these insects excrete sticky, sugar-rich fluid called honeydew. And this causes the fibres to adhere to each other making the lint difficult if not impossible to gin (process). This condition which is commonly called 'stickiness' in the cotton industry can slash the marketable value of the crop because traders will prefer not to buy. Further damage will be done if black sooty mould fungi grow on the sticky lint to make it black and dirty looking. Cotton farmers should never pack away the sprayer until the cotton lint is picked and safely gathered in. ■



*Spraying cotton with the Micron Micromax CDA sprayer.*

Image credit: Micron Sprayers

# Sustainable fisheries management



*Technology has the potential to increase production and enhance ecological sustainability in commercial aquaculture management.*

Image credit: Richard Carey/Adobe Stock

With the global per capita fish consumption increasing in the past few decades, implementing various aquatic technologies is crucial for smart, high-performing fish as well as improved disease management.

**G**LOBAL FISH PRODUCTION has increased rapidly in the last four decades, contributing significantly to the world's fish supply for human consumption. According to the UN Food and Agricultural Organisation (FAO), aquaculture accounts for about 44.3 per cent of the world's food fish. This rapid growth in fisheries products have enabled per capita fish consumption to nearly double globally in past 60 years and more than triple in developing countries.

Due to the massive demand of smart and high performing fish worldwide, the global fisheries sector faces many challenges such as disease resistance, stress modulation, broodstock improvement, development of appropriate feeds and feeding mechanisms, hatchery and grow-out technologies, as well as water quality management and controlling water pollution.

To address these concerns of aquaculture production, a number of scientific

interventions are being adopted to enhance the productivity, quality, food safety and profitability. The development of various technological applications in fisheries sector aims to provide healthy and fast-growing aqua produces, through a means of environmentally friendly ways.

### **Aquaculture biotechnology**

The application of biotechnology to fish farming has the potential to increase production and enhance ecological

**Biotechnology has a great impact on aquaculture and fisheries production, as well as managing fish genetic resources."**

sustainability in commercial aquaculture management. According to FAO, biotechnology can help in reproduction and early development success of cultured organisms. In addition to this, biotechnology can also help in improving the reproductive success and survival of endangered species, thereby helping to identify and conserve aquatic biodiversity.

FAO further added that the genetic improvement programmes can also significantly address the new markets demands for farmed products. The organisation cited that carp and tilapia culture in Asia is benefiting from genetics research in a number of areas, including genetic sequencing and the development of specific genetic markers.

"The traditional technique used for many generations by farmers throughout Asia has been selecting fish by desirable phenotypic traits for breeding, on an ad hoc basis. This has led, in many cases, to in-breeding and suppression of optimum production performance," FAO stressed.

Biotechnology can also play a vital role in disease management, in producing specific pathogen free (SPF) and specific

pathogen resistant (SPR) stocks, which are notified as direct trade barriers and threats to optimal production.

“Besides screening for pathogens, biotechnological methods can be used to ascertain other health parameters, including haematocrits, leucocrits, blood cell differentials, neutrophil oxidative radical production, myeloperoxidase activity and phagocytic functions,” emphasised FAO.

### In-feed technologies too

Aquafeed technology is receiving leading edge advances in aquaculture management practices. Ideally, fishmeal is used for high quality protein content in commercial fish production. However, in some cases, the use of fishmeal can be costly and be responsible to the environmental perturbation. One example is eutrophication that emerges from excess nutrient waste in the water body.

“The major users of fishmeal are terrestrial agriculture, and the salmon, bream, bass and shrimp farming sectors are using species that would not normally be used for human consumption, the concerns of consumers provide a strong impetus to find ways to replace fish meal with vegetable protein from more sustainable sources,” stressed FAO.

“The major users of fishmeal are terrestrial agriculture, and the salmon,

## ■ Sonar and GPS technologies play crucial role in modern aquaculture production.”

bream, bass and shrimp farming sectors are using species that would not normally be used for human consumption, the concerns of consumers provide a strong impetus to find ways to replace fish meal with vegetable protein from more sustainable sources,” stressed FAO.

Commenting on the importance of collaborations of various communities in developing scientific applications, FAO said that countries and international organisations need to assist in research, capacity building and infrastructure development. Improved exchange of information and discussion between scientists, researchers and producers from different regions on their problems and achievements will undoubtedly help this important sector to further develop with the view to increasing sustainable aquatic animal production globally.

FAO further emphasised, “The emphasis on biotechnology and its contribution to food security, poverty alleviation, and income generation is increasing and we need

to be prepared to address the challenges this will bring, and develop these technologies in a responsible manner.”

Going forward, biotechnology also has the great potential to observe and detect the presence of toxins, contaminants and any residues, thus improving safety, freshness, colour, flavour, texture, taste, nutritional characteristics and shelf-life of cultured food products in future aquaculture development practices. With the help biotechnological researches, genetic make-up of aquatic products can be properly analysed, which will be helpful in understanding gene regulation, sex determination of the aquatic species.

### Holding systems are important

The US freshwater farming sector is increasingly using indoor closed-recirculation systems to boost tilapia production, as well as carp, bass and perch. According to FAO, as the modern-day holding technology, the closed-recirculation systems can significantly reduce fishmeal consumption compared with openfield farming.

“Recent technological advances in the salmon farming have been particularly in sea-cage design. In the past, the industry had typically used steel-framed rectangular support structures for the net cages, with walkways around them as work platforms. With the exception of the pond rearing of some marine species practised in Asia, this general cage design has also typified the commercial culture methods used for most other sea fish, including Asian grouper and snapper, and the Mediterranean seabass and bream,” expressed FAO.

### ICT for fishing

In modern fishing techniques, information and communication (ICT) technologies are used with an aim to efficiently analyse fish activities. The Sound Navigation Ranging (Sonar) allows an operator to interpret information and locate schools of fish and is used by commercial fishermen. The Global Positioning Systems (GPS) provides web-based information on fishing communities, preferred locations and water activities. ■

*ICT applications in fisheries are used for:*

- Better monitoring, control and auditing
- Improved planning of fisheries
- Information sharing and collaboration to enhance productivity
- Assisting fishermen on scientific farming practices



Image credit: jgtraktuda/Adobe Stock

*The aim is to provide healthy and fast-growing aqua produces, through a means of environmentally friendly ways.*

# POULTRY BUYERS' GUIDE

# 2019

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

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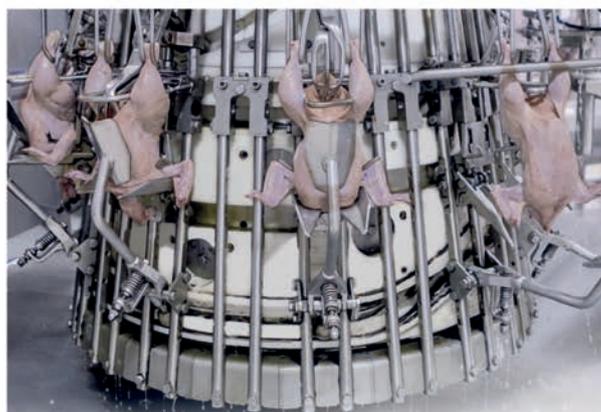
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# EAT-Lancet's recommendations are at odds with sustainable food production

The EAT-Lancet report has recommended changing diets and global food systems

**D**UE TO A fundamental lack of agricultural understanding, some of the main dietary recommendations are incompatible with the food production outcomes of truly sustainable farming systems. For instance, in prioritising reductions in beef and lamb consumption over poultry consumption, the resulting environmental and health outcomes will both be negative.

If fully implemented, the recommendations would make it impossible to introduce sustainable and restorative farming systems in countries like the UK, where a high proportion of farmland is only suitable for growing grass. In addition, grass and grazing animals need to be reintroduced into many all-arable crop rotations to address the serious problems of soil degradation and biodiversity loss.

The failure to make a stronger recommendation in relation to reducing poultry meat consumption is misguided. We recognise that meat consumption overall needs to be reduced, but poultry is

in direct competition with humans for grain. Although intensive cattle in some countries are fed on grain, ruminants in many countries predominantly eat grass and arable by-products which humans cannot digest. In relation to the environment, our analysis is that for net greenhouse gas emissions, soil degradation, biodiversity, diffuse agrochemical pollution and human health, reductions need to be made in meat that is largely fed on grain, not meat that is predominantly fed on grass.

Patrick Holden, chief executive of the Sustainable Food Trust (SFT), said, "We welcome the fact that the report highlights the urgent need for fundamental change in farming systems and diets. However, it does

**There is an urgent need for fundamental change in farming systems and diets."**

little to inform the public about the path to a sustainable future and in some key respects will make things worse."

Many of the report's recommendations, such as increased consumption of vegetables, whole grains, nuts and legumes are all sound, but when it comes to protein and fats the recommendations to depend so heavily on plant sources, poultry rather than red meat and unsaturated fats compared with saturated fats are fundamentally flawed. Humans have evolved as red meat eaters and, providing this is part of a balanced diet, beef and lamb provide superior types of protein and fat to plant sources.

Many studies have shown that in drought-prone regions of the world, in particular, and areas with poor soil quality, the most important thing is to maintain or build soil organic matter and this can only be achieved sustainably by integrating crop and livestock production and introducing nitrogen by deep-rooting leguminous plants rather than soluble fertiliser. ■

*Sustainable and restorative farming systems are necessary.*

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