US$15.00 (UK£9.00)

VOLUME 32 ISSUE 1 2015

Far Eastern Agriculture

VIV Asia 2015

Region's biggest livestock event is back

Cause and effect of mycotoxins in poultry - p14

UN alliance to converge at GFIA 2015

Ensure safe travel of pigs

Totally into tea

Technology aiding agricultural processes

Poultry Buyers' Guide

VIV Asia 2015

March 11-13, 2015 | **BITEC, Bangkok Thailand**

REGISTER NOW
for FREE entrance and
high quality conferences
at www.viv.net

Special Events

- AQUATIC
- BIOGAS
- CROPTECH FEEDTECH
- DAIRY TECH
- MEAT TECH
- PET HEALTH & NUTRITION

Special Theme
PORK PRODUCTION

The world's most promising meeting point
to boost your business from Feed to Meat.

vnu exhibitions asia pacific

vnu exhibitions europe

Photo: www.backyardchickens.com

Advanced low-cost sensors for poultry management

Vietnam to push itself as 'macadamia kingdom'

Audit Bureau of Circulations - Business Magazines

Far Eastern Agriculture

www.fareasternagriculture.com

Managing Editor : Rhonita Patnaik - Email: rhonita.patnaik@alaincharles.com

Editorial and Design team: Prashant AP, Hiriyti Bairu, Sindhuja Balaji, Andrew Croft, Thomas Davies Ranganath GS, Prasad Shankarappa, Zsa Tebbit, Lee Telot and Ben Watts

Publisher: Nick Fordham

Publishing Director: Pallavi Pandey

Magazine Sales Manager: Richard Rozelaar, Tel: +44 207 834 7676, Fax: +44 207 973 0076 Email: richard.rozelaar@alaincharles.com

Country	Representative	Phone	Fax	Email
China	Ying Mathieson	(86)10 8472 1899	(86) 10 8472 1900	ying.mathieson@alaincharles.com
India	Tanmay Mishra	(91) 80 6684483	(91) 80 40600791	tanmay.mishra@alaincharles.com
Nigeria	Bola Olowo	(234) 8034349299		bola.olowo@alaincharles.com
South Africa	Annabel Marx	(27) 218519017	(27) 46 624 5931	annabel.marx@alaincharles.com
UAE	Camilla Capece	(971) 4 448 9260	(971) 4 448 9261	camilla.capece@alaincharles.com
USA	Michael Tomashefsky	(1) 203 226 2882	(1) 203 226 7447	michael.tomashefsky@alaincharles.com

Head Office:
Alain Charles Publishing Ltd
University House
11-13 Lower Grosvenor Place
London SW1W 0EX, United Kingdom
Phone: +44 20 7834 7676
Fax: +44 20 7973 0076

Middle East Regional Office:
Alain Charles Middle East FZ-LLC
Office 215, Loft 2A
PO Box 502207
Dubai Media City, UAE
Phone: +971 4 448 9260
Fax: +971 4 448 9261

Production: Nikitha Jain, Nathanielle Kumar, Donatella Moranelli, Rachel Neeson and Sophia White - Email: production@alaincharles.com

Subscriptions: circulation@alaincharles.com

Chairman: Derek Fordham

Printed by: Times Printers Private Limited

Far Eastern Agriculture
(ISSN 0266-8025)

Alain Charles Publishing

Brazilian meat processor BRF SA eyes Asian expansion

BRAZIL'S BRF SA is aiming to expand further into Asia by building on a recent Indonesian joint venture with more partnerships and acquisitions, the company has announced. BRF SA had recently sealed a US$200mn joint venture with Indofood to debut on the Indonesian consumer market. Marcos Jank, head of corporate affairs at BRF SA, said, "Our goal is to do in Asia what we did in the Middle East." According to Jank, Asia is a huge potential market for BRF SA. "Home to half of the world's population, it consumes only one-quarter of the poultry that Brazil does on a per capita basis, while the global average for chicken consumption is twice of what it is in Asia." Jank singled out China, Indonesia, India, Malaysia and Thailand as potential markets. BRF SA was formed through a 2009 merger of the two biggest local poultry and meats processors — Perdigao and Sadia.

BRF SA has singled out China, Indonesia, India, Malaysia and Thailand as potential markets

Filipino food company buys over Vietnamese hog farm from Hormel Netherlands

THE PHILIPPINES' SAN Miguel Pure Foods has bought over partner company Hormel Netherlands B.V. to become the full owner of the Vietnamese company. San Miguel Pure Foods (SMPFC), wholly-owned unit San Miguel Purefoods International Limited (SMPFIB), had signed an agreement for the purchase of Hormel's 49 per cent stake in San Miguel Pure Foods Investment (BVI) Ltd. Prior to the acquisition the offshore unit owned 51 per cent. SMPFIB is the sole investor in San Miguel Hormel (Vn) Co. Ltd., a Vietnam registered company that is involved in livestock, feed production and meat processing. An SMPFC spokesperson said, "Following the completion of the transaction, SMPFIB will be wholly-owned subsidiary of SMPFIL." The company has several food brands in its portfolio including Magnolia, Pure Foods, Monterey, Star, Dari Crème, etc.

John Ma is the new country head of EW Nutrition Korea

EW Nutrition launches office and appoints country head in South Korea

GERMAN FOOD ADDITIVES firm EW Nutrition has launched EW Nutrition Korea and appointed John 'JongSun' Ma as the country manager. He will be in-charge to further drive the business with a clear customer orientation, the company noted. John Ma finished his Bachelor Degree in animal science at Seoul National University. He started his professional career in the Philippines and holds several sales positions for one of the leading meat and feed production companies in Asia. Moving from the Philippines to South Korea – he worked in a responsible role as senior manager before he joined the EW Nutrition team. John Ma will be working from Seoul. Jan Wesjohann, managing director at EW Nutrition, said, "With John Ma, we found a person with excellent skills and a brilliant knowledge profile that fits ideally to our vision that we developed for Korea."

Delacon sets up new office in India and hires country manager

DELACON, PIONEER AND leader in phytogenic feed additives, opened new office in Indian city of Bangalore and has hired Jeetendra Verma as the country manager. Owing to rise in disposable income, increased awareness about protein requirement, changing lifestyle and aspirations as well as increasing retail and branded foods, there is an increasing trend in the consumption of meat and meat products in India and the Indian subcontinent region. Accordingly, Delacon said that it sees this region as a potential market place for its phytogenic feed additives. "In India, a new trend is seen in which both producers and consumers are concerned about food safety and the demand for antibiotic-free food products such as milk and meat is on continuous rise. I want to develop the upcoming trend of phytogenic feed additives and establish this new concept in India and neighbouring countries," Verma said. Verma has a PhD in Poultry Nutrition with specialisation in Mycotoxins. He started his career as assistant professor of Poultry Science in an agriculture university in India. He moved to poultry industry in 1998 and has plenty of experience in feed marketing, feed additive business and veterinary health care products.

Betagro to begin construction of new pet food facility in Thailand

BETAGRO GROUP HAS announced plans to build a US$31mn pet food factory in Thailand to cash in on rising domestic demand. According to *Bangkok Post*, Chayanon Kittayachaweng, senior vice-president for animal health and technology, cited an estimate by Euromonitor International that pegged demand for quality pet food in Thailand at 14,800 tonnes a month. Construction of the factory on a 46-rai plot in Lop Buri Province will begin later in 2015 and is expected to be ready to operate early next year. In the first phase, it will have monthly production capacity of 4,000 tonnes of pet food to serve markets such as pet farms, pet shops, veterinarian clinics and modern trade outlets. Part of the production is set for export to Asia and Europe. Pet food is among the businesses of Betagro Group, which achieved US$2.52bn in revenue in 2014 from sales of chicken meat, pork, eggs and other foods as well as animal feed and drugs.

The new plant will add 4,000 tonnes to its pet food production, distributed under the Dog'n Joy, Cat'n Joy, Perfecta and Bingo brands

EVENTS 2015

APRIL			
16-17	**3rd China Dairy Industry Summit 2015**	Beijing, China	www.duxes-events.com/dairy3/index.html
17-18	**Agritech Expo Zambia**	Chisamba, Zambia	www.agritech-expo.com
21-25	**China Feed Expo**	Jiangsu, China	www.chinafeedexpo.com
23-25	**INPALME**	Medan, Indonesia	www.palmoilexhibition.com
MAY			
3-5	**International Animal Industry**	New Delhi, India	www.iaiexpo.com
18-20	**China Animal Husbandry Expo 2015**	Chongqing, China	www.caaa.com.cn/2015/en/index.php
19-21	**VIV Russia**	Moscow, Russia	www.vivrussia.nl/en/bezoeker.aspx
28-30	**Dairy & Poultry Expo 2015**	Dhaka, Bangladesh	www.limraexpo.com/events/dairynpoultry
JUNE			
9-11	**VICTAM International 2015**	Cologne, Germany	www.victam.com
11-13	**VIV Turkey**	Istanbul, Turkey	www.vivturkey.com
24-26	**Livestock Philippines 2015**	Pasay City, The Philippines	www.livestockphilippines.com
JULY			
13-15	**4th International Conference on Agriculture & Horticulture**	Beijing, China	agriculture-horticulture.conferenceseries.com
29-31	**INDO LIVESTOCK 2015 Expo & Forum**	Surabaya, Indonesia	www.indolivestock.com/index.php
SEPTEMBER			
21-23	**Livestock Asia 2015**	Kuala Lumpur, Malaysia	www.livestockasia.com

Philippines agribusiness sees growth despite typhoon

THE PHILIPPINES' AGRICULTURE is well-positioned to sustain its growth momentum in 2015, agriculture secretary Proceso Alcala has announced as the department has been vigorously pursuing rural infrastructure and technology build-up that would further develop and modernise the agricultural economy.

Alcala said that the growth areas include the crops sub-sectors, led by rice and corn.

Fisheries are also expected to recover from last year's slowdown, while livestock and poultry are projected to register a respectable expansion, he added.

"The noteworthy performance of Philippines agriculture in 2014, notably the 4.8 per cent increase in output in Q4 2014 from the 0.9 per cent growth in the same period in 2013, is indicative that the industry is firmly into the path of sustained expansion," Alcala said. "Growth was achieved despite the strong typhoons that battered some key production areas," he added.

Overall, the agri-fishery sector grew by 1.83 per cent last year in terms of volume and nearly 10 per cent in terms of value, the Philippines Statistics Authority said in a separate report.

Palay and corn sub-sectors output also reached new historical highs. Palay output reached 19mn metric tonnes or 2.87 per cent more than last year's harvest, while corn production at 7.8mn metric tonnes was higher by 5.33 per cent.

Alcala said that DA has been gearing up for the ASEAN economic integration this year, which is expected to usher in more intense competition among southeast Asian nations for their agri-fishery exports.

Food Outlook

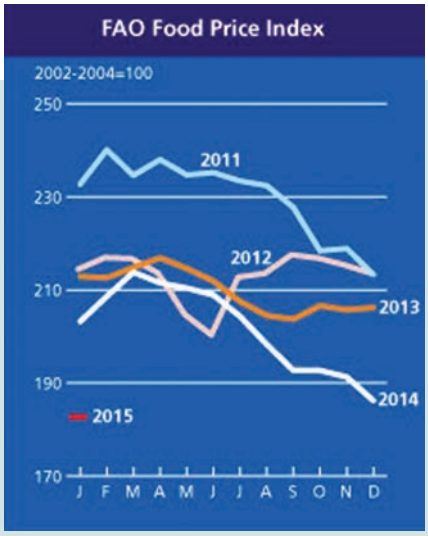
THE FAO FOOD price index averaged 182.7 points in January 2015, down 3.6 points (1.9 per cent) from its revised (reduced) December 2014 value. While prices of sugar and dairy products stayed virtually unchanged, those of the other commodities included in the Index fell in January, with cereals and oils registering the strongest declines. Except for a short-lived respite in October 2014, the FAO food price index has been falling every month since April 2014.

The FAO cereal price index averaged 177.4 points in January, down 6.6 points (3.6 per cent) from December. This marked decline was mostly driven by a seven per cent reduction in international wheat prices, as coarse grains and rice subsided by only one per cent or less. The sharp fall in wheat prices reflects confirmation of an ample supply situation this season and stronger likelihood of inventories reaching their highest level in over a decade. At its current value, the FAO cereal price index has fallen to its lowest since July 2010 and is now as much as 90 points (34 per cent) below its peak (267.7 points) in June 2008.

The FAO vegetable oil price index averaged 156 points in January, down 4.7 points (2.9 per cent) from December and its lowest level since October 2009. Prices of both palm and soy oil fell, reflecting weak import demand for palm oil and prospects of ample soybean supplies. Furthermore, the lingering weakness in crude oil prices continued to weigh on vegetable oil quotations by eroding the competitiveness of vegetable oils as biodiesel feedstock.

The FAO dairy price index averaged 173.8 points in January, essentially the same level as in December. A decline in prices for cheese and skimmed milk powder was counterbalanced by a rise in the price of butter, while whole milk powder was unchanged. The fall in the value of the Euro has caused export quotations from Europe to converge with offerings from Oceania and the USA. The arrival of new supplies to the world market is being tempered by dry weather in Oceania, which is leading to an accelerated decline in seasonal milk production, while output in the European Union as a whole has been curbed to avoid over-quota levies, as the April-March quota year draws to a close.

The FAO meat price index averaged 194.3 points in January, down 3.2 points (1.6 per cent) from its revised December value. Falling currency exchange rates relative to the US dollar, especially the Euro, were partly responsible for the decline. The main products affected were pigmeat from Europe, bovine meat from Australia and ovine meat from New Zealand. Additionally, abundant export availability continued to weigh on pigmeat prices. The downward revision of the meat price index for December, from 204 points published last month to 197.5 points, was mainly caused by an unanticipated sharp fall in export prices for Brazilian pigmeat and to a lesser extent Brazilian poultry.



The FAO sugar price index averaged 217.7 points in January, virtually unchanged from December 2014. Uncertainty ahead of the new Brazilian sugar harvest, which normally begins in April, sustained export prices. However, its effect on the index was largely neutralised by expectations of ample supplies in the major sugar producing areas, including India, Thailand and the EU.

Unlike for other commodity groups, most prices utilised in the calculation of the FAO meat price index are not available when the FAO food price index is computed and published; therefore, the value of the meat price index for the most recent months is derived from a mixture of projected and observed prices. This can, at times, require significant revisions in the final value of the FAO meat price index, which could in turn influence the value of the FAO food price index.

Myanmar and Cambodia seek investors to increase domestic rice yield

MYANMAR AND CAMBODIA have announced that they want to participate in the global rice business by intensifying rice farming and milling across their respective countries with the help of foreign investors including ones in the Middle East, China, South Korea, Japan and Thailand.

Myanmar was the largest rice exporter in the world before the 1960s, but with the military government taking over in 1962, the industry quickly declined. Today, the most acute problems are low productivity and poor rice quality at the farm level, with paddy yields only half of those in other exporters in the region such as Thailand and Vietnam. The milling sector is in dire need of upgrading its processing units to end significant losses in quality and quantity during the milling. Infrastructure upgrades along trade routes and ports are also necessary, as well as better water management in the central plains where most of the rice fields are located, reports have suggested.

Vichai Sriprasert, president of Thai Rice Exporters Association who was in Myanmar in early February, said that up to eight million hectares of land in Myanmar – in addition to the existing farmland used for rice – could be developed. A large rice mill with a capacity of 500 tonnes a year would cost an investment of just around US$9.4mn, excluding land.

The global rice trade is expected to hit 41.9mn tonnes this year

So far, most of the rice produced in Myanmar, around 12.6mn tonnes annually, is used for domestic consumption. Yearly export is just slightly over 1mn tonnes. However, the government has set itself the target of exporting 2mn tonnes of rice this year and 4mn tonnes by 2020, mainly to China, the European Union and the Middle East.

Cambodia, on the other hand, has even more complex problems. In a country where 80 per cent of the population actually works on farms, productivity and yields of rice farming used to be among the world's lowest, with only slight improvement in the past decades after the country shrugged off its war-torn past. Main issues are under use of arable land, low-quality seeds, poor infrastructure and no government-induced financing or loan programmes for farmers, let alone for agricultural research. However, the government in Phnom Penh has adopted a new rice policy to promote growth in paddy production and milled rice exports to match the growth seen in the garment and service sectors, also with the help of foreign investors. The Cambodia Rice Federation has said it will set up a rice development fund to educate farmers and promote Cambodian rice overseas.

Of Cambodia's total production of around 4.7mn tonnes of milled rice in 2014, the country exported just 387,100 tonnes. The initial target for 2015 was one million tonnes of rice exports, which will be 'unlikely to achieve due to lack of milling capacity and funding,' Cambodian minister of commerce Sun Chanthol said early February. "We are trying to find new foreign markets for our rice," he added.

Thailand to install GPS tracking devices in fishing boats

THAILAND HAS ANNOUNCED that it will start installing GPS tracking devices in the country's fishing boats and register them in line with the European Union's IUU fishing regulation.

The IUU regulation also offers the possibility to blacklist states that turn a blind eye to illegal fishing activities

The EU regulation to prevent, deter and eliminate illegal, unreported and unregulated fishing (IUU) entered into force on 1 January 2010. Prior to the regulation, an estimated US$1.25bn worth of illegal fish entered the EU each year.

Nath Chabchai, deputy director general of the marine department in Thailand, said, "Thailand has stepped up the issuance of preventive and repressive measures against human trafficking in the form of fishery labour and illegal fishery in recent years."

Chabchai revealed that the Fishery Act will be promulgated in June 2015 and would enable both the fishery department under the Ministry of Agriculture and the marine department under the Ministry of Transport to better cooperate in governing Thailand's fishing industry.

The new regulation has been adapted to suit Thailand's fishing industry and increase the efficiency in monitoring and preventing any illegal practices including a use of forced labour on the country's fishery vessels, noted Chabchai.

Fish species discovered in India

FOUR NEW FISH species have been found in the South Indian state of Kerala. The species have been named *Puntius nelsoni, Puntius nigronotus, Systomus chryseus* and *Systomus rufus,* said Mathews Plamoottil, a zoology professor at Kollam's Baby John Memorial Government College.

Elaborating, he said that the body and fins of *Puntius nelsoni* are yellowish in colour, the head is deeper, the snout shorter and the mouth wider. It was discovered at Kallumkal in Thiruvalla, at the place where Pamba and Manimala rivers merge. The *Puntius nigronotus* was discovered at Mananthavady in the hilly Wayanad district. Its dorsal fin is black in colour, the lateral line scales are greater than its closest relatives and its dorsal fin has more rays. *Systomus chryseus* was discovered from Keezhvaipur near Thiruvalla. It is golden in coloured and its pectoral fin is greatly elongated. *Systomus rufus* was discovered from Venpala, also near Thiruvalla. Its fins are red in colour.

"It is interesting to note that a new species of the genus Systomus is being discovered after one-and-a-half century from Kerala. All the four new species have received a Zoo bank register number from the International Commission of Zoological Nomenclature, the worldwide scientific authority for naming new animals. The new fish have been deposited in the museum of the Zoological Survey of India at Kolkata and Kozhikode,"the professor added.

Indonesia to double aquaculture production in four years

THE INDONESIAN GOVERNMENT has set a target to achieve 31.3mn tonnes of fish from aquaculture by 2019, a two-fold increase compared to the current yearly production.

"In the next five years, the country aims to jack up fish farming production to 31.3mn tons per year, valued at US$28.67bn," said coordinating maritime affairs minister Indroyono Soesilo.

Currently, the country produces 13.3mn tons of fish from farming worth US$8.8bn, reported the *Jakarta Post*.

Production comprises 22mn tons of seaweed and nine million tonnes of fish, Soesilo added.

To reach the target, the government said that it would expand farming areas up to 26.8 per cent within the next five years from 10.8 per cent currently.

According to the minister, the government would focus on shrimp, ornamental fish, grouper and red snapper in oceanic fisheries, while freshwater fisheries would focus on edible nila, patin and catfish.

Meanwhile, the Sustainable Fisheries Partnership (SFP), with funding from the Walmart Foundation, is launching Aquaculture Improvement Projects in Indonesia, China, and Thailand.

Shrimp farmers in Indonesia and Thailand and tilapia farmers in China will receive training and knowledge to help them improve their livelihoods and increase collaboration to manage and improve water quality and reduce incidences of disease outbreaks.

The project will create a zonal approach to form local management groups for greater sustainability in the fish-farming environment, SFP added.

China resumes poultry exports to Hong Kong

HONG KONG HAS resumed poultry imports from China in February 2015 with the onset of the Lunar New Year.

Over 2,000 live chickens and doves raised in the Chinese mainland were shipped to Hong Kong for sale at wet markets in mid-February, ending an import suspension imposed after birds in Hong Kong were found infected with bird flu in January this year.

According to official sources in China, the special administrative region culled around 15,000 chickens at a poultry market in January, and its authorities suspended imports from the Chinese mainland for three weeks.

The ban was lifted on 10 February 2015.

Winter and spring are a high-incidence period for bird flu. Thousands of chickens have been culled beginning this year in south China's Guangdong Province, which borders Hong Kong.

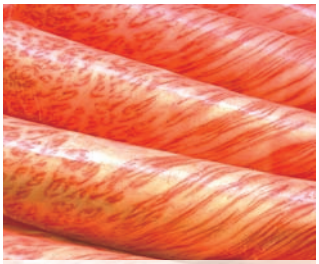
There have been 44 confirmed cases of H7N9 human infection in Guangdong since January, including one reported in February. Shanghai, Fujian, Jiangxi and Zhejiang in east China all reported cases last winter.

Officials with the inspection and quarantine bureau for Shenzhen, the Guangdong city closest to Hong Kong, said they have stepped up inspections and dispatched specialist workers for on-site quarantining, as Hong Kong consumers' demand for poultry is set to surge during the coming Lunar New Year.

Japanese beef gets promoted for exports under new name

JAPAN'S KYOTO PREFECTURE has begun promoting its marbled 'wagyu' beef under a new brand name in a push to expand exports.

The first 500 kg batch under the 'Kyoto Beef Miyabi' brand was sent to Singapore on 2 February 2015. In March this year, a 300 kg shipment is destined for the USA.



Wagyu beef export destinations expanded in 2014, with product sent to 17 markets

"We are determined to do everything thoroughly, from brand establishment to quality assurance," said Kyoto vice-governor Akimasa Yamashita.

Wagyu is a type of beef that comes from any of four specific strains of Japanese cattle acclaimed for their tender meat.

At a Kobe trade show in November, Kyoto wagyu beef was crowned the champion product over other world-renowned Japanese beef brands such as Hida, Matsusaka and Omi.

Prefectural authorities and industry organisations involved in the project plan to expand Miyabi beef into a unified Kyoto beef brand once it takes off as an export brand. Meanwhile, Japan's Ministry of Agriculture, Forestry and Fisheries added that the export of the Asian nation's agricultural, fishery and food products hit a record high in 2014.

Philippines fuelling Australia's red meat industry growth

AUSTRALIA, THE LARGEST exporter of red meat to the country, sees the Philippines as a prominent market in southeast Asia despite an anticipated slowdown in global exports of Australian red meat this year.

The thriving food service scene in the Philippines and the shift to a more protein-based, rather than a starch-based, diet as purchasing power rises, are expected to keep demand high, the Meat and Livestock Australia (MLA) has announced.

The enforcement of the ASEAN-Australia-New Zealand Free Trade Agreement (AANZFTA) in 2015 that eventually lowered to zero tariffs on beef and lamb exports is also contributing to sustained high demand for Australian red meat in the country, MLA added.

Fast urbanisation and expansion of the financially-empowered middle class in the Philippines was fuelling the protein consumption, MLA noted.

In the Philippines, more restaurants are now offering a wide range of meat options, taking advantage of Australia's capacity to supply red meat for every type of requirement – from restaurant grade cuts, to hamburger patties and corned beef for manufacturing companies, MLA country manager Peter Paul Perez said.

Although price remains a main consideration for the Filipinos, consumers are also placing emphasis on quality. Perez noted that Australian beef is well-known from its traceability traits. Traceability is an instrument to assure food quality, particularly safety, in agri-food chains worldwide.

Philippines beef imports from Australia increased 27 per cent in 2014 to 34,352 metric tonnes; lamb imports by 18 per cent to 566 metric tonnes; and mutton by 73 per cent to 62 metric tonnes

The industry also remains free from animal diseases.

Therefore, Australia has cornered 47 per cent of the Philippines market for red meat, 2013 data from the Bureau of Animal Industry showed.

Its main competitors are New Zealand, which has a market share of 21 per cent, the USA with 16 per cent and Brazil holding 13.9 per cent.

The Australian red meat industry is valued at US$13.2bn and holds four per cent of the world's cattle inventory.

Its largest export markets are southeast Asia, China, Japan, USA and South Korea.

Cocoa Revolution 2015 to urge for better production

THE COCOA REVOLUTION event will zoom in on advances, trends and cocoa market dynamics, according to organisers.

To be held in Singapore at GoodWood Park Hotel on 4-5 March 2015, CMT's inaugural Cocoa Revolution summit will feature discussions on 'Profiting from Cocoa as Demand Rises in Asia's Emerging Markets'. The event will see decision makers of the cocoa and chocolate industry convene in the city.

Besides reviewing emerging markets, processing trends, yield and quality improvement, the summit will also present perspectives from Latin American countries like Peru and Ecuador and key updates on cocoa bean varieties like CCN 51 with good yield potential, and resistance to the diseases.

Among the speakers to be present at Cocoa Revolution include Dennis Melka, founder and CEO of United Cacao Limited SEZC, who will share his perspective on 'New Cocoa Plantation Project in Peru' and V. Srivathsan, managing director for Africa & Middle East at Olam International Limited presenting the company's 'Cocoa Position and Value Chain Activities in Africa'. Gerard Stapleton, head of South-East Asian Research of LMC International Ltd, would also be present and share a 'Global View on the Future of Cocoa Market and Dynamics of Butter/ Powder Balance'.

According to the organisers, there is a growing interest in fine flavor cocoa varieties and carefully crafted products

Country-specific cocoa production trends will be presented via sessions such as 'Colombia: Diversifying the cocoa market with fine flavor cocoa varieties by Zarahemla Fine Foods'; 'Malaysia: Innovations and product development to grow Malaysia as Asia's cocoa producer by Malaysian Cocoa Board'; 'Philippines: Can Philippines emerge as the top quality cocoa bean supplier? by Kennemer Foods International, Incorporated (KFI)'; 'Vietnam: Raising the bar for best cocoa quality in Asia by Puratos Grand-Place® Vietnam'; 'West Africa: Ghana: Adding value to our raw materials & improving cocoa quality and yield by Niche Cocoa Industry Limited', besides others.

Chinese cocoa consumption is poised to rise 40 per cent in 2013-18, UK-based market intelligence firm Euromonitor said.

Translating genomic knowledge into plant breeding and crop improvement at CROPS 2015

GENOMICS RESEARCHERS AND plant breeders from around the world will convene at the HudsonAlpha Institute for Biotechnology in Huntsville, the USA, 18-21 May 2015 to discuss the latest genomic technology in plant breeding and crop improvement.

Presented by HudsonAlpha Institute for Biotechnology and the University of Georgia College of Agricultural and Environmental Sciences, the CROPS 2015 conference will focus on improving crop sustainability through genomics. Co-chaired by Jeremy Schmutz, HudsonAlpha faculty investigator and manager of the HudsonAlpha Genome Sequencing Center, along with Scott Jackson, director of the University of Georgia Center for Applied Genetic Technologies and Peggy Ozias-Akins, director of the UGA Institute of Plant Breeding, Genetics and Genomics, CROPS will bring together leading researchers applying genomic based techniques to crop improvement, plant molecular breeding experts, and traditional breeders interested in applying these techniques within their crops of interest.

An important goal of CROPS is to further the discussion of applying these genomic tools to the vital area of developing world germplasm

"We are honoured to partner with the HudsonAlpha Institute to bring the best researchers in the world working on the application of genetics and biotechnology to crop improvement to share their cutting edge research with crop scientists from around the world," Jackson said.

Tremendous progress has been made in plant genomics in just a few short years. Plant researchers have gone from generating a single reference genome for a single plant to generating hundreds of reference plant genomes.

"Applying genomic technology in plant research is very powerful because we can actually breed plants to achieve a desired outcome," Schmutz said. "With the advancement of genomic technology we are able to identify the target traits in a plant that may be crossed in to produce coveted characteristics."

Despite the amount of progress, one of the most difficult problems for plant genomics still exists: integrating and translating this genomic knowledge to improve plant breeding and crop production efforts.

"We can now produce genomic information at reasonable costs, we can sample vast numbers of cultivars, so how do we go from having that base level of knowledge to being able to actually accelerate the improvement of these crop species?" Schmutz noted.

The GSC contributes an enormous amount of the genomic infrastructure for plants, but there is a huge translation gap between the genomic data and how it is integrated and applied to breeding and improvement. CROPS seeks to open the dialogue between plant genomic experts, groups applying genomic tools to breeding and selection and to breeding organisations that would benefit from these tools. An important goal of CROPS is to further the discussion of applying these genomic tools to the vital area of developing world germplasm.

An excellent group of speakers have been selected from the some of the key areas in crop genomics.

Thailand gears up for a bigger VIV Asia this year

The biennial event is back in Bangkok with more conferences and inaugural shows, proving its supremacy in Asia once again

VIV ASIA, THE biggest regional tradeshow for agriculture, horticulture, livestock and fisheries, will be held in the Thai capital of Bangkok on 11-13 March 2015.

The trade fair would kick off the Agri-Food Business Week Asia event at the Bangkok International Trade and Exhibition Centre (BITEC).

The organisers of the biggest regional tradeshow, VNU Exhibitions, said that they expect more Malaysian participants this year.

The number of visitors totalled at 33,229 from 118 countries in 2013

Licking the way to better farm profits

TITHEBARN'S SALT-BASED SPECIALIST animal feed supplements help livestock achieve full complement of minerals and trace elements, which enables them have improved appetite and better feed conversion. This, in turn, leads to increased milk and meat production.

Tithebarn manufactures mineralised salt blocks at its factory based at Winsford in Cheshire, the UK. A strategic location, the facility is in close proximity to the rich source of salt that was once the seabeds and covered the land some 200mn years ago.

The salt that forms the base of specialist animal feed supplements has been named Rockies. The blocks are as hard as rock, which can be fed to the animals either indoors or outdoors, regardless of the weather conditions.

Currently, Tithebarn exports to over 50 countries worldwide. An important and significant part of their operations is southeast Asia and over 50 per cent of their business looks after the needs of livestock in China, Korea, Thailand, Malaysia and the Philippines.

Therefore, the company said that, on a daily basis, it can be deduced that 'more than 1.5mn livestock are licking Rockies and helping to improve the farmers' profitability.'

When it was last held in 2013, VIV Asia had 700 exhibitors covering the latest technologies for the production of meat, eggs, fish and shrimps. This time around, the number of exhibitors has increased to 850, the organisers revealed.

VNU Exhibitions Europe BV project manager Ruwan Berculo said that a temporary structure would be erected next to the existing halls at BITEC to house the additional pavilions.

He added that while VIV Asia 2015 would remain focused on poultry and eggs, the production of pork and the latest technologies involved with it would also be given more prominence as several leading suppliers of equipment had signed up to show their products for the first time. Among the other animal protein-related events include the Aquatic Asia conference and the Dairy Tech seminar covering the aquaculture and milk businesses.

"We estimate that there will over 35,000 animal protein professionals and associated buyers from Asia, Africa and the Middle East. We believe we will have people from every continent because the show has grown into such a big international event," Berculo noted.

Innovations presented by around 300 prominent companies from more than 20 countries will be displayed across 8,000 sq m

In 2013, a total of 1,407 Malaysian visitors were recorded at VIV Asia, making them among the top five foreigners at the exhibition after Vietnam (1,981), Indonesia (1,940) Philippines (1,860) and India (1,791).

Berculo said that VIV Asia would be a valuable business platform for Malaysian businesses involved in animal protein production and processing industries.

As for the agricultural and horticultural sectors, last year's Horti Asia and Agri-Asia events attracted 116 Malaysian trade visitors, followed by Vietnam's 84, Indonesia's 68 and and India's 66.

VNU Exhibitions Asia Pacific project manager Chinakit Viphavakit said Horti Asia

and Agri-Asia shows to be held 17-19 March, would be especially worthwhile for visitors, entrepreneurs and farmers because in addition to new technologies, there would also be exhibitions of machinery, expertise and innovations from many countries suitable for every size and range of investment.

"Innovations from some 300 prominent companies from more than 20 countries will be on show across 8,000 sq m. The pavilions will showcase cutting edge technologies in the pre-planting process, cultivation, maintenance, harvest and post-harvest management," Viphavakit revealed.

The conferences are an integral part of VIV events

VIV MEA 2016 third international hub

VIV Worldwide also announced VIV MEA that will be held from 16–18 February 2016 in Abu Dhabi, the UAE. VIV MEA joins VIV Europe and VIV Asia as the third international hub in the organiser's portfolio of major business events for the animal protein sectors.

VIV MEA will be the new specialist Feed-To-Meat show serving the poultry, aquaculture and dairy industries in the Middle East, Africa, India and Central Asia. "We will be using all our experience with our existing international hubs — VIV Asia and VIV Europe — to make sure that VIV MEA exactly serves the businesses that produce and process animal proteins within the region that extends from the Middle East to India and down into Africa," Berculo noted. For all these targeted visitors, Abu Dhabi is an affordable destination within easy reach, according to the VIV Worldwide head.

2015 edition to introduce pet health and nutrition

A special conference will take place during the VIV Asia 2015 to highlight the multi-billion-dollar companion animal market at world- and Asian level from the viewpoint of nutritional and healthcare products, particularly for dogs and cats.

The Pet Health and Nutrition Conference will be a one-day meeting for Asian feed manufacturers and supply companies wanting to develop their activity in the pet sector. It has been set on the opening day of VIV Asia 2015.

The "Mycotoxins in Focus: Trends, Facts, and Effects" conference is set to provide an insight into the latest mycotoxin trends and occurences to delegates at VIV Asia 2015.

The second edition of the 'Mycotoxins in Focus' conference builds upon the success of the inaugural edition held at VIV Europe 2014 in Utrecht, The Netherlands. The educational presentations from BIOMIN experts and renowned academics from Asia will provide new insights into mycotoxin risk management, an overview of developments on mycotoxin occurrences in Asia over the last decade, and their effects on animal production.

The number of visitors totalled at 33,229 from 118 countries in 2013, which far exceeds the expected figure of 27,000. Visitors rated the exhibition with a score of 8.3, while exhibitors rated VIV Asia 2013 as 8.1. □

Products to look out for at VIV Asia 2015

Termotecnica Pericoli's innovative fan adds depth to making production more efficient

Termotecnica Pericoli, renowned for its range of quality performance climate and environment equipment and systems in the agricultural sectors of livestock and horticulture production, has introduced ACF 26/21, which has up to 25 per cent increase in thrust, 10 per cent increased airflow and capacity, and a decrease of five to 10 per cent in energy consumption. Features that contribute to this product's success include all-new 6 blade Peraluman (high-tech aluminium alloy) propeller assembly, and motor mounts which are aerodynamically designed to stabilising the airflow and increase the efficiency in addition to robustly supporting the motor.

Noteworthy is the fact that during the recent Bess Lab independent performance verification process this little high performer was rated in the top five per cent of all comparable and competitive fans.

The new ACF 26 compliments the company's full range of ventilation and climate equipment to meet every specification and requirements to compliment the livestock and horticultural production in either individual components or in balanced and integrated systems.

Stand no: H105.H015

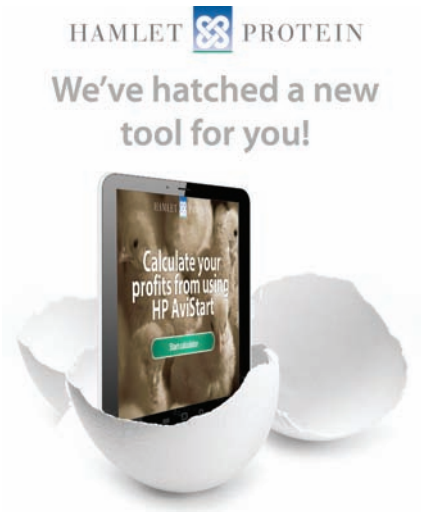
Calculate your broiler returns

Hamlet Protein's new calculator can help estimate the potential return on investment for the broiler farm by using HP AviStart.

The producer has to enter the key feed and production figures to find out how much more profit they can expect when they replace soyabean meal in the starter feed with as little as five per cent HP AviStart.

After just 10 days of using HP AviStart, chick performance at slaughter is clearly improved:

- Lower feed conversion ratio
- Lower mortality
- Higher end weight
- Positive return on investment



Hamlet Protein's new calculator for broiler performance

The calculator draws on the results of our global feeding trials.

You can try the calculator online at *www.hamletprotein.com/broilercalculator* or you can stop by Hamlet Protein

Stand no. H102.J074

UN alliance to converge at GFIA 2015

THE INAUGURAL MEETING of the Strategic Committee for the Global Alliance for Climate Smart Agriculture (GACSA), since its formation in September 2014, is set to take place at the Global Forum for Innovations in Agriculture (GFIA) in Abu Dhabi on 9 March 2015.

Held under the patronage of HH Sheikh Mansour Bin Zayed Al Nahyan, deputy Prime Minister of the UAE, and in strategic partnership with the Abu Dhabi Food Control Authority (ADFCA), the exhibition and conference will feature more than 300 next-generation agricultural solutions that could shape the future of sustainable farming around the world.

GACSA was launched by the United Nations during the UN Climate Summit in New York in September 2014 to bring together the key players in this key area. It is a voluntary, farmer-led, multi-stakeholder, action-oriented coalition committed to the incorporation of climate-smart approaches within food and agriculture systems. The alliance will seek to improve people's food and nutrition security by helping governments, farmers, scientists, businesses, and civil society, as well as regional and international organizations, to adjust agricultural practices, food systems and social policies so they take account of climate change and the efficient use of natural resources.

Founded by FAO, the Netherlands and the World Bank, the alliance now represents over 70 members. The high-level of Ministerial engagement at GFIA, bears testimony to the growing movement behind CSA's potential as a game-change for the agriculture sector, in the context of the climate change discussion.

GFIA is the only major international exhibition and conference in the world focused on how technology is employed to produce more food, sustainably, whilst using less resources

Inge Herman Rydland, co-chair of GACSA and a speaker at GFIA's Climate-Smart Agriculture Summit, summarised the value of climate-smart agriculture, as, "It is unacceptable that close to one billion people go to bed hungry every night. We can change this by providing farmers worldwide with the right knowledge and the right tools. Climate smart agriculture is one of the most significant tools in our armoury."

Mark Beaumont, event director, GFIA, added, "It is absolutely critical that countries, organisations and individuals take up membership of GACSA. It's free and straightforward — and membership provides an opportunity to join the debate and to help shape the future, in terms of both food production and climate change."

He added that it was also important to highlight the role that Abu Dhabi was able to play in bringing together participants from the entire agricultural value-chain. "This will be one of the most significant events for climate-smart agriculture in this decade, uniting all the key players." ☐

Cause and effect of mycotoxins in poultry

The chemicals produced by fungi can also lead to serious illness in animals, which eventually can affect milk or meat productivity

DEGRADATION OF POULTRY feed by microbes is a constant threat but some fungal moulds add an extra even more dangerous dimension to poultry health and nutrition as toxic chemicals called mycotoxins.

These 'signature' chemicals are produced by specific fungal moulds that may grow on feed and feed materials. They negatively impact on all types of livestock but some are particularly poisonous to poultry. They are toxic in minute amounts (ppm and ppb) and can be transferred into the human food chain via poultry meat and eggs. All types of poultry are affected as are consumers of contaminated poultry products.

Chickens, turkeys, ducks, geese, quail and pheasants are all susceptible to mycotoxicosis and especially when caused by the aflatoxins, trichothecenes, ochratoxin A and some of the fusario-toxins. Consequences for avian body metabolism and poultry health are wide-ranging, potentially serious and may include immuno-suppressive, carcinogenic and mutagenic (genotoxic) effects.

Mycotoxin contamination is widespread and prevalent in the tropics and mycotoxicosis is regarded as the single most serious constraint on poultry production in hot, wet and humid climates

Aflatoxin is a group of four naturally occurring chemicals (Aflatoxin B1, B2, G1 and G2) produced by *Aspergillus flavus* and *A. parsiticus*. These are widespread and serious fungal contaminants of tropical and sub-tropical crop commodities and notably maize, groundnut and dried coconut. Aflatoxin depresses growth of broilers at extremely low concentrations (much less than 1 ppm) and aflatoxin B1 is the most toxic of the four.

Ochratoxin A, which is produced mainly by *Aspergillus ochraceus* in the tropics and several species of Penicillium in temperate climate, is a common contaminant of cereal grains and mouldy groundnuts. This potent poison exhibits extreme pathogenicity to chickens at concentrations as low as 0.3ppm.

Mycotoxins can be passed unaltered from feed to eggs

DON (deoxynivalenol) and T-2 produced by Fusarium fungi are two of the most damaging chemicals within the large trichothecene group of mycotoxins. Fusarium graminearum and F. sporotrichioides, the main producers of DON and T-2 respectively, are closely associated with leaf and ear diseases of cereal crops and the subsequent contamination of harvested grains including wheat, barley, oats and rye. Dietary concentrations of T-2 in excess of 3.0ppm cause feed refusal through irritation of the mucosa of the mouth and oesophagus.

Zearalenone, which is most important and best understood of the so-called Fusario-toxins, is produced by *F. roseum* and is often found together with DON in contaminated grain. Zearalenone mimics the female hormone oestrogen and is mostly a problem in pigs. But it can be used as 'biological marker' for other Fusario-toxins found in grain and which target poultry. These include Fusarochromanone produced by *F. equiseti* and causing skeletal problems in poultry due to calcium and phosphorous imbalance.

Mycotoxin production

Mycotoxin producing fungi rely on a window of opportunity created by available moisture in feed material and favourably high ambient temperature and humidity.

Mycotoxins cannot be avoided, only managed. Focus and emphasis is on depriving these mould fungi of the conditions necessary for growth and mycotoxin production, and as far upstream as possible.

The 'seeds' of mycotoxin synthesis are often 'sown' well before the feed bin or poultry feeder by plant pathogens like Fusarium which cause disease in the leaf, stem and ear of small grain cereals such as wheat and barley. Grain farmers can minimise the incidence and level of mycotoxin production by following good agronomic practices that maximise crop resistance and minimise fungal disease. Efficient harvesting and proper cleaning, drying and storage of grain is vital to maintain mycotoxin contamination at an absolute minimum.

It is important to maintain the equilibrium moisture content of the stored cereal grain. For example, at 70 per cent relative humidity the equilibrium moisture content is 140g/kg for shelled corn, 136 g/kg for soft winter wheat and 135 g/kg for barley. At levels above these the grain may start to show spoilage due to mould activity. For copra, the key is rapid drying of fresh coconut from its 50-55 per cent moisture level down to six to seven per cent using an optimum temperature over a 72-hour period.

Some poultry farming systems are acutely prone to the effects of specific mycotoxins. This is due to a combination of the high susceptibility of the type of poultry and

proneness to contamination of the feed material used.

Alflatoxicosis in ducks is the prime example. Comparative studies show ducklings and turkey poults are the most sensitive of all commercial poultry to aflatoxin. Ducks are much more sensitive to aflatoxin than are chickens. Of the crop commodities used as poultry feed groundnut and copra are among the most susceptible to aflatoxin contamination. As a precaution feed materials containing groundnut should never be offered to ducks. Aflatoxin poisoning in ducks is particularly prevalent in the coconut producing nations of southeast Asia where copra cake or meal remaining after coconut oil extraction is commonly used in the feed rations offered to ducks.

Poultry mycotoxicosis

Use of superior breeds and best practice management continues to improve feed conversion, live-weight gain and meat and egg production, but these potential gains are often constrained by feed-borne mycotoxins.

Most poultry mycotoxicoses are caused by continual low intake of toxin over an extended period of time. Typical chronic symptoms are poor feed conversion efficiency, reduced growth and sub-optimal production. However, these symptoms may also be due to nutritional imbalance, heat stress and pest/parasite infestation.

Poor feed conversion efficiency and sub optimal poultry production in the absence of these factors normally indicates mycotoxin contamination of feed, but there are specific indicators too. Ingestion of higher concentrations of mycotoxin leads to acute clinical symptoms associated with specific vital organs, the immune system and other aspects of avian physiology. Mortality is often high. Accurate identification of mycotoxin poisoning in poultry flocks requires a wide consideration including evaluation of flock history, clinical and post-mortem examination, histopathological and serological investigation and feed analyses.

Aflatoxins are potent liver poisons causing severe economic loss in all types of poultry. Associated clinical symptoms include anorexia, decreased feed efficiency, reduced weight gains and egg production, haemorrhage, embryotoxicity and increased susceptibility to environmental stress and microbial infection. Aflatoxicosis is recognised by specific histopathological changes to the birds' hepatic system (liver and associated organs). Tissue lesions specifically indicating aflatoxicosis are atrophy of the liver tissue with fatty infiltration and bile duct proliferation and fibrosis.

Ochratoxin A primarily targets the kidneys and urinary system, but may also damage the liver at high concentration. Birds show classic 'wet droppings' symptoms caused by diuresis; broiler growth rate is depressed and affected flocks are anaemic. Ochratoxicosis is implicated in decreased skeletal density leading to a condition called 'field rickets'.

Ducks are susceptible to alfatoxin poisoning

The T-2 toxin damages tissues and organs by hitting at the very heart of cell metabolism. It causes primary inhibition of protein synthesis and has a secondary effect on DNA and RNA synthesis and cell division. T-2 effects show up in tissues and organs where cells are actively dividing, such as the lining of the gastrointestinal tract, the skin and blood. T-2 mycotoxin poisoning is confirmed by post-mortem examination showing oral lesions. Birds affected by T-2 mycotoxin suffer retarded growth, abnormal feathering, anaemia and oral lesions, the latter decreasing feed intake to reduce live-weight gain, egg production and shell quality.

Immune response

Aflatoxins, Ochratoxin A and T-2 mycotoxins are all immuno-suppressive to poultry. Affected flocks become more susceptible to primary viral respiratory infection and secondary infection by opportunistic bacterial pathogens. Birds contract infections because of impaired acquired immunity or reduced native resistance.

The bursa of Fabricus, thymus and spleen, and to a lesser extent the cecal tonsils and bone marrow, contribute to humoral and cellular immunity. The cell-mediated immune response is controlled by T-cells originating in the thymus. The humoral immune response, by production of antibodies or immunogloblulin (mainly IgM and IgA), is controlled by the B-cells from the bursa of Fabricus and bone marrow.

Aflatoxins are the most immuno-suppressive of all the mycotoxins. They depress both cell-mediated and humoral immune responses to lower the overall defence mechanism of the bird. T-cells are more susceptible to aflatoxin than are B-cells. Thus, low level ingestion of aflatoxin affects the cell-mediated response, while higher levels begin to depress immunoglobulin production and anitbody response. Aflatoxins decrease the activity of phagocytes directly and indirectly by impairing the action of a heat-stable serum-factor responsible for their activity. Aflatoxin lowers activity of 'Complement' which is a serum constituent produced by the liver.

Tricothecenes, as a group, are the second most important of the immuno-suppressive mycotoxins, although the effect of T-2 on its own is equal that of any single aflatoxin. T-2 primarily affects the cell-mediated response through direct effect on bone marrow, spleen, lymph nodes, thymus and intestinal mucosa where it damages actively dividing cells. Ochratoxin A impairs both cell-mediated and humoral responses by atrophy of the thymus and reduced circulation of immunoglobulin and phagocytes. □

Some effects of aflatoxin on the immune system

- Reduction in phagocytosis by macrophages
- Reduction in delayed cutaneous hyper-sensitivity
- Reduction in IgG and IgA concentration in serum
- Reduction in 'Complement' activity
- Reduction in bactericidal activity of serum

— By Dr Terry Mabbett

Advanced low-cost sensors for poultry management

ADVANCES IN CONSUMER technology have allowed researchers to explore a new range of possibilities for low-cost advanced sensor systems for poultry processing and management, according to Colin Usher of the Georgia Tech Research Institute's Food Processing Technology Division.

Advanced automation and robotics systems for manufacturing have been expensive to develop, with price tags ranging from US$50,000 to over US$500,000 due in large part to the high cost of the sensors. For poultry companies to be able to justify implementing these types of systems in processing plants, costs need to be significantly lower.

Hence, recent developments in consumer technology have brought to market several low-cost sensing solutions. This dynamic shift has allowed researchers at the Georgia Tech Research Institute's Food Processing Technology Division (FPTD) to explore a new range of possibilities for low-cost advanced sensor systems for poultry processing and management.

One such example of a newly available low-cost sensor is the Nintendo Wii video game controller that uses accelerometers and gyros based on advanced inertial navigation systems from military aircraft such as the USAF C-141. A US$30 controller now contains the same sensors that previously cost thousands of dollars.

Most recently, these sensors can be purchased in single units for as little as US$10. Microsoft changed the playing field with the release of a 3D sensor called the Kinect for US$199. This device was originally developed for use with their video gaming system, the XBOX 360.

Microsoft released a Kinect sensor for the PC along with a software development kit and a commercial license to allow for development of commercial applications outside of their core video game space. The Kinect sensor uses a structured light approach to generate a 3D image. This is achieved by using a projector to project an infrared light pattern onto objects in the sensor's field of view. This pattern is then processed and deformations identified in the pattern allow the Kinect to generate a 3D image.

Earlier this year, Microsoft released the second generation of their Kinect sensor, dubbed Kinect V2. The Kinect V2 is a next-gen time-of-flight (TOF) camera that boasts a resolution of 512×424 pixels and a cost of US$199. In comparison, the FPTD research team purchased a TOF camera with a resolution of 320×240 pixels in 2010 for a whopping US$8,000.

A TOF camera works by modulating a light source and calculating the time it takes for that light to reflect off an object and return to the sensor.

Taking poultry production to another level

THE EQUIPMENT OF a poultry house plays an important role in producing good results. Systems should contribute to the performance of animals and ensure convenience working methods and labour saving. A long lifetime of systems also ensures maximum results for the long-term. In addition, all systems should reinforce and connect each other. The complete picture has to be right.

In this way, Jansen Poultry Equipment supports poultry farmers with the complete design of their house and shares its knowledge about poultry and technology. The company also helps farmers to take their poultry production to another level.

Applying knowledge of poultry on technique

Systems that support natural needs of animals in the right way increase their performances. The design of housing systems like materials, shape and arrangement of parts must be developed on the basis of poultry knowledge. What is the behaviour of poultry? Which materials does poultry prefer? How can behaviour be influenced in a positive way? These and other crucial questions are being answered by Jansen Poultry Equipment during the development of new systems.

Take for instance the design of a laying nest. Hens prefer to lay their eggs in a shielded and dark environment. By taking this and other knowledge into account, Jansen Poultry Equipment has designed comfortable and attractive laying nests. These nests affect the nesting behaviour in a positive way. Knowledge about the vulnerability of eggs has contributed to sanitary nests and an exact measured roll distance from the eggs to the egg belt. The nest, therefore, captures the sanitary condition and quality of eggs. The results of poultry farmers that produce with systems of Jansen Poultry Equipment show that this design works. The quality of eggs is excellent. The hatchability of eggs is very high. And hens prefer to lay their eggs in the nests.

Jansen Poultry Equipment has designed comfortable and attractive laying nests

Managing systems on the basis of animal knowledge

Also responsible for the behaviour and performance of poultry are the drinking and feeding lines, ventilation and light. Incorrect placement of feeding and drinking lines for example may lead to an increased amount of floor eggs. Feeding lines in front of the laying nest block the access to the laying nest during feeding. Drinking lines in front of the nests on the other hand, attract birds to the nests. Ventilation is of great importance for performance. Drafts in the nests do not benefit the nest visit. Also not to forget is the lighting scheme that plays an important role in daily routine and laying behaviour of poultry. There are many other factors that determine the performance of poultry.

Efficient production

Excellent performance of poultry is one important aspect for success. Another success factor is the efficiency of the production. For example, a solution for efficient processing of eggs is an egg transport system with egg packer and palletizing or setter tray robot. The egg transport system brings eggs safe out of the house and transports them to the central packaging area. Here the eggs are being packed into trays or setter trays. A palletizing or setter tray robot places trays accurately onto pallets or into containers. The quality of the eggs is preserved and more eggs can be produced per hour. Labour saving, quality eggs and fast processing are the results.

Jansen Poultry Equipment are exhibiting at VIV Asia 2015 and will be at ***Stand No: H105.F001***

New soybean variety offers high protein and feed efficiency

A NEW NON-GENETICALLY modified soybean developed by scientists at the University of Arkansas Division of Agriculture not only produces more protein than the average soybean, but also yield more bushels per acre and provide a higher feed efficiency than most conventional soybeans.

Listed as UA 5814HP, the new soybean developed by UA Division soybean breeder Pengyin Chen, in effect, offers the potential to improve feed efficiency for poultry, beef and aquaculture producers and yield potential for row-croppers, the *Times Record* reported. "It's an important discovery as a feed meal ingredient," said Rick Cartwright, associate director at the University of Arkansas cooperative extension service.

"This has a significant increase in protein control for conventional soybeans. It's raised the bar."

The bean's protein level at maturity is over 45 per cent, or at least five percent higher than a regular commodity soybean. And it produces a feed meal with over 52 per cent protein. According to the Arkansas Soybean Promotion Board, the normal raw soybean in Arkansas is approximately 36 per cent protein and 19 per cent oil. When processed into soybean meal the concentration of crude protein is increased to 44 per cent. That equates to a 20 per cent improvement for feed meal.

Ensure safe travel of pigs

Good handling and transportation practices will improve pig welfare and reduce transport losses

TO MAINTAIN AN adequate level of animal welfare during the marketing process requires having a fit pig that is carefully managed and handled, according to Dr Temple Grandin of Colorado State University.

Managers need to be committed to training and supervising employees to ensure high standards of animal treatments.

The study, which looked at the effects transport on animal welfare, has shown the trailer compartment in which pigs are shipped has a significant effect on their levels of stress during transport and subsequent meat quality. It provides guidance on handling during loading on the farm, truck stocking density, and fitness of pigs for transport.

Severe overloading of trucks results in clear evidence of physical stress

Loading and Unloading Equipment

Non-slip flooring is essential on loading ramps and alley floors. A good non-slip finish can be achieved by impressing wet concrete with a stamp made from expanded metal mesh. The ramp angle should never exceed 20º for a non-adjustable ramp and 25º for an adjustable ramp. Market pigs have become much heavier and in 2014 the recommended ramp angle decreased to less than 20º. Fifteen degrees or less is recommended for heavy 125 kg pigs, for both adjustable and non-adjustable ramps. A pig's heart rate will increase as the angle of a loading ramp increases. Cleats on ramps should be spaced to fit the normal walking stride of an animal. For 114 kg market weight pigs, the cleats should be on 20 cm) centres, using 2.5cm × 2.5cm cleats. Missing cleats must be immediately replaced to prevent leg injuries. Stair steps work well on concrete ramps. For market weight pigs, they should have a six cm rise and a 25 cm long tread.

Small piglets can get dewclaw injuries when they go down a ramp designed for market-weight pigs. The piglets slip and damage their dewclaws because the cleats are too far apart. To prevent injuries to young piglets, small closely spaced cleats are required.

Pig movement through alleys and chutes can be greatly affected by air movement, shadows, and lighting. Pigs have a tendency to move from a darker area towards a brighter area. Adding a lamp or moving a lamp will often facilitate animal movement.

Excitability can be reduced and the pigs will be easier to drive if the producers walk through the pens every day. Pigs with previous experiences with handling are easy to move. Pigs which have been moved out of their pens and into the aisles during finishing are easy to drive. Moving the pigs out of the finishing pens a month prior to slaughter also improve their willingness to move.

Conditions on the Truck

Overloading of trucks may be a major cause of increased stress and death loss. Severe overloading of trucks results in clear evidence of physical stress. On long trips, pigs should have sufficient room to lie down without having to be on top of each other. For market

weight pigs weighing 131 kg, losses are reduced when each pig has a minimum of 0.462 sq m of floor space on the truck.

Market weight pigs remain standing when a trip is under three hours and they lie down for longer trips. On longer trips, more space will be required so that all of the pigs will have space to lie down without being on top of others. For longer trips, increase the space 15 to 20 per cent depending on air temperature.

Research has shown that pigs can suffer from motion sickness. Feed withdrawal prior to transport will help prevent motion sickness and vomiting during transport. Feed withdrawal 16 to 24 hours prior to stunning will also help prevent carcass contamination and may help reduce pale soft exudative (PSE) meat. Longer fasts would be detrimental to animal welfare and reduce carcass weight. Pigs must be provided with water until loading and immediately after unloading.

To keep pigs warm in the winter and to prevent frostbite, deep bedding with either straw or shavings is required when the temperature is below 0°C. When the temperature drops to -12°C, straw is recommended for extra warmth. On aluminium-sided trailers, plastic boards can be inserted to block ventilation holes.

When the temperature is below -6°C, the trailer should be 96 per cent boarded. When the temperature rises to 16°C, all the boards should be removed. For intermediate temperatures, the trailer can be 25 per cent to 50 per cent boarded. During extreme cold, the trailer may have to be lined with wood or plastic to prevent the pigs from contacting cold metal.

During the summer when the temperature is over 16°C, wet shavings or sand should be used. Straw bedding is too hot and excessive bedding may increase deaths. At 27°C, pigs should be sprinkled with water immediately after loading. After sprinkling, the truck should immediately start moving to create evaporative cooling. Wetting pigs in a stationary truck can cause problems with high humidity and a 'sauna' effect.

Heat builds up rapidly in a stationary vehicle. If a truck has to stand when the temperature is over 27°C, it should be parked by a fan bank. Another good alternative when a packing plant has a break-down is to provide ventilation by keeping the trucks moving. Death loss increases as temperatures increase. Truck drivers should drive carefully and avoid sudden stops and rapid acceleration.

Fit for travel

Sows should be marketed when they are fit for travel. USA's National Pork Board advises that sows and pigs that are unable to walk and will not recover should be euthanised on the farm. They should not be transported through market channels. Pigs which have temporarily become non-ambulatory must be allowed to recover before they are put on a truck. Another factor that can affect pig handling and transport is feeding ractopamine (Paylean). High doses of ractopamine can make pigs more sluggish and slower to move. Pigs fed 20 mg per kg of ractopomine are more susceptible to handling stress when they are handled aggressively and shocked with electric prods. Finishing pigs fed a low dose of 10 mg per kg had no effect on the percentage of non-ambulatory pigs. The author has observed at slaughter plants that there have been increased problems with non-ambulatory pigs due to excessive dosages of re-partitioning agents. These drugs must be used carefully. □

Nose can reveal a cow's MOO-d, UK study finds

GLOBAL CAMPAIGNING ORGANISATION World Animal Protection (WAP) published its first study exploring whether nasal temperatures can be used as a measure of positive emotions in cows.

Published in Physiology and Behaviour journal, scientists highlighted how findings from their study could provide a way of assessing positive emotions in cows.

Previous literature has shown a strong connection between peripheral temperatures (skin, nose and ears) and high arousal negative experiences. Stress, fear and frustration have all been found to cause a drop in peripheral temperatures in mammals. However, little is known about whether the experience of positive emotions affects peripheral temperatures.

Analysis revealed that a drop in nasal temperature occurred when the cows were stroked, as they enjoyed a positive, relaxed emotional experience

In the study of 13 cows, the researchers sought to identify whether the nasal temperature of cows could be reliably used as a measure of positive emotional state in cows.

The study involved putting the cows into a calm and relaxed state by stroking them, in a similar manner to allogrooming (the grooming of another individual).

The scientists did this more than 350 times, remotely recording the cow's nasal temperatures before, during and after they were being stroked.

Analysis revealed a drop in nasal temperature occurred when the cows were stroked, and experiencing the positive, relaxed emotional experience.

Sentience manager at World Animal Protection Helen Proctor said, "Understanding how animals express positive emotions is an important area of focus for animal welfare science, yet it is widely neglected.

"The necessity is not to prove animals have a range of emotions, but to measure it. In doing this, the key is to show not just that pain and suffering is removed, but to draw attention to the importance of good welfare and how to understand the positive emotions an animal will display."

WAP concluded the drop in nasal temperature indicated the change in the cow's emotions from neutral to positive, and these results offer insight into the use of peripheral temperatures as a measure of animal emotions.

The study was carried out at Bolton's Park Farm, which is part of the Royal Veterinary College, Potters Bar.

The WAP authorities said that they did the research so that they could monitor how the cows are being treated in the farms, and now they hope that it could help them raise awareness of the benefits for pasture-based farming rather than intense dairy farms.

How to maintain water quality for fish management

Aquaculture can assist in the ever-increasing demand for seafood while ensuring that existing fisheries remain sustainable and consistent

WATER QUALITY IS the most important factor affecting fish health and performance in aquaculture production systems. Good water quality refers to what the fish wants and not what the farmer thinks the fish wants. Fish live and are totally dependent on the water they live in for all their needs.

Different fish species have different and specific range of water quality aspects (temperature, pH, oxygen concentration, salinity, hardness, etc.) within which they can survive, grow and reproduce.

Within these tolerance limits, each species has its own optimum range, that is, the range within which it performs best. It is therefore very important for fish producers to ensure that the physical and chemical conditions of the water remain, as much as possible, within the optimum range of the fish under culture all the time. Outside these optimum ranges, fish will exhibit poor growth, erratic behaviour, and disease symptoms or parasite infestations. Under extreme cases, or where the poor conditions remain for prolonged periods of time, fish mortality may occur. For producers to be able to maintain ideal pond water quality conditions, they must understand the physical and chemical components contributing to good or bad water quality.

Physical Aspects of Water Quality

Temperature: Fish are cold-blooded and, therefore, assume the temperature of the water they live in. Water temperature is, thus, the most important physical factor for fish survival and growth. Body temperature, and the water temperature, has an effect on level of activity, behaviour, feeding, growth and reproduction of the fish. Each species has its tolerance limits and optimum range. When water temperatures are outside the optimum range, fish body temperature will either be too high or too low and fish growth will be affected or the fish will even die.

Turbidity: Turbidity can result from suspended solids (clay) or plankton. Clay turbidity in pond water (muddy water) can be harmful to fish and limit pond productivity. Clay turbidity in pond can be controlled by:

- Treating affected ponds with animal manures at rates of 2.4 trillion per ha every three weeks or agricultural limestone, using recommended rates to improve soil pH and water alkalinity
- Avoiding stocking species that stir up pond bottom mud
- Designing water supply system such that muddy water can be diverted away from ponds

pH level: Fish production can be greatly affected by excessively low or high pH.Extreme pH values can even kill your fish. The growth of natural food organisms may also be greatly reduced. The critical pH values vary according to the fish species, the size of individual fish and other environmental conditions. Most cultured fish will die in waters with pH below 4.5 and 10 or above. Fish reproduction and general performance can be greatly affected at pH below 6.5 and above 8.5.

Dissolved oxygen in fish ponds: The most important gas dissolved in water is oxygen. Dissolved oxygen (DO) is essential for respiration and decomposition. Dissolved oxygen in water comes from atmospheric oxygen and photosynthesis. The atmospheric oxygen diffuses and dissolves into the water. But the diffusion and its subsequent dissolves into water is a slow process. The major source of dissolved oxygen in ponds is photosynthesis. However, this process depends on the amount of light available to the aquatic plants in water. Therefore, it is seen that oxygen production decreases during cloudy days and stops at night. It decreases in increase in water depth the rate of the decrease depending on the water turbidity.

Substances toxic to fish and other organisms such as herbicides, insecticides, and other chemicals should be kept out of the ponds

Toxic Materials

Substances toxic to fish and other organisms (herbicides, insecticides, and other chemicals) should be kept out of the ponds. Ponds should be protected by:

- Not using insecticides, herbicides, or other chemicals (except for recommended inorganic fertilisers) in or near your pond
- Keeping agricultural runoff from the ponds
- Avoiding spraying agricultural crops near ponds on windy days ☐

Copper fungicide for Phytophthora control in cocoa

Routine application of cuprous oxide to control pod rot will keep cocoa trees epiphyte-free

PROPERLY MANAGED COCOA plantations have long and fruitful lives. Initial investment is high but early rewards are low with trees taking five years or more to bear a full crop of cocoa pods. Henceforth, farmers can reap profits for up to 50 years providing trees are well looked after and cocoa markets are receptive, but it doesn't take long for cocoa left in the 'wilderness' to become overloaded with pests, parasites and epiphytes.

Why any tree crop should be allowed to decline into disrepair is a mystery but commodity prices are notoriously fickle often full of promise at planting but rock bottom five years later. Farmers faced with low prices will invariably minimise inputs, harvest what they can and switch future investments into shorter-term cash crops.

Plant and site factors generally make cocoa unattractive for weeds but ideal for pathogens and plants that grow on trees. These long-lived evergreen trees bearing pods all year round under high rainfall and humidity in closed-canopy environments offer ideal conditions for disease development and spread.

Structural tree repair including replanting and tree height reduction, by removing all growth which is 1.5 metres to two metres above soil level is the priority in any cocoa rehabilitation programme. Farmers can then concentrate on 'redecoration' by spraying with copper fungicide to manage diseases and epiphytes.

Copper fungicides have over 100 years of trouble-free use in cocoa and still monopolise the market but like all pesticides are subject to increasing scrutiny. The USA, European Union and other major importers of cured cocoa beans set maximum residue limits (MRLs) for each pesticide. Copper fungicides are among the most benign pesticides applied to cocoa and can be used on organically grown cocoa within the limits laid down by organic farming organisations.

Phytophthora on cocoa

A wide range of diseases occur are spread amongst the various cocoa producing regions of the world, but only Phytophthora pathogens infect cocoa to cause Phytophthora pod rot wherever the tree crop is grown. At least eight different species of this fungus-like pathogen have been recorded on cocoa with four – *Phytophthora palmivora, P. megakarya, P. capsici* and *P. citrophthora* – the most frequent and damaging. *P. palmivora* is the most widely spread has the broadest host range and causes Phytophthora stem canker in southeast Asia. *P. megakarya* which occurs in West Africa is the most aggressive species with extra epidemiological dimensions through soil-based sporulation on cocoa debris.

Phytophthora thrives in free water and high humidity infects most parts of the tree and is yield-limiting worldwide. Early mycologists described the 'Oomycetes', to which the Phytophthora pathogens belong, as the 'water fungi'.

Phytophthora readily exploits neglected cocoa by generating and maintaining perpetually active reservoirs of inoculums on pods whether attached to the tree or on the ground, and stem cankers in the living bark. Epiphytes including lichens, bryophytes (mosses and liverworts), pteridophytes (ferns) and bromeliads may directly damage cocoa trees and will also aggravate Phytophthora disease through prolonged surface wetness, increased humidity and by trapping spores washed down through the canopy.

Epiphytes including mosses rapidly colonise cocoa trees if not routinely sprayed with copper fungicide to control Phytophthora pod rot

Copper fungicides kill germinating spores before the germ tube has chance to penetrate the pod surface. Pods are protected from infection provided copper fungicide is deposited before the inoculums arrive and the copper fungicide residues remain at fungitoxic levels.

Cuprous oxide

First copper fungicide to be used was Bordeaux mixture in the 1880s and made by mixing hydrated blue copper sulphate with calcium hydroxide (slaked lime) to overcome the high solubility of the copper sulphate. Fixed (sparingly soluble) copper compounds including copper oxychloride, cupric hydroxide, tribasic copper sulphate, copper ammonium complexes and red cuprous oxide were developed in first half of the 20th century and have now been used commercially as fungicides for over 80 years.

Cuprous oxide fungicide is particulate (composed of discrete particles) and marketed as a wet powder or wet granule formulation. On an equivalent mass (weight) basis cuprous oxide is considered to be the most active of all the fixed copper compounds used as agricultural fungicides. The molecular weight breakdown of the three most widely used fixed copper fungicides reveals the proportions of active copper to be 88 per cent, 65 per cent and 55 per cent, respectively, for cuprous oxide, cupric hydroxide and copper oxychloride.

Sustainable use

Control of Phytophthora pod rot by targeted spray deposition, minimal run-off and weathering requires:

- Sprays timed with dry-weather windows
- Targeting of flower cushions and pods at all stages of development
- Fungicide formulations with resistance to weathering
- Reduced application frequency without compromising protection

Newly formed pods — cherelles — are particularly vulnerable to infection from either germinating spores or established infections within the flower cushion (Picture courtesy: Trond Kristiansen at Nordox)

Spraying before the rains arrive or during prolonged dry spells should pre-empt sporulation and provide sufficient time for deposits to harden and dry. Fixed copper fungicides are naturally tenacious with smaller particles adhering more strongly to plant surface through an increasing surface area to mass ratio. For instance, Agro-grade cuprous oxide manufactured by Nordox AS in Oslo Norway is micronized to a mean particle diameter of 1.2 micron. Field studies showed how this benefits dispersion and suspension in the spray tank, resistance to weathering (wind, water and growth movements), fungicide efficacy and disease control.

Cocoa pods are borne down the entire vertical tree profile from branches high in the canopy to positions on the trunk just centimetres above soil level.

Narrow cone nozzles delivering relatively low flow rates with small droplet size spectra achieve a higher deposit per unit spray emitted compared with the variable cone nozzles that invariably supplied with lever operated knapsack sprayers. The higher dose transfer efficiency thus achieved is particularly important in realising the high performance potential of contact-acting fungicides like cuprous oxide.Tenacity and resistance to weathering is important but deposits should not be static. A key strength of fixed copper fungicides is their sparingly soluble property affording local redistribution of copper ions in water films over the same pod. And down through the canopy in drips, splashes and rivulets to protect susceptible new pods produced in between spray applications.

Cocoa grown in Nigeria, Cameroon and wetter parts of Cote d'Ivoire in West Africa receives 10-12 applications per year, while in wettest areas of Papua New Guinea cocoa is sprayed on a weekly basis. Crop loss from Phytophthora pod rot across Brazil's huge Bahia state is related to variations in rainfall. Areas with most rainfall and highest disease pressure regularly recorded 100 per cent pod infection and required frequent application with cuprous oxide to secure worthwhile yield.

Brazilian agronomists concerned about the cost and logistics of frequent application consolidated spray programmes into fewer applications at higher dose rates so the amount of cuprous oxide applied per year stayed the same. Success was ascribed to the high redistributive capacities of cuprous oxide deposits over extended periods of time. High concentration application produced a correspondingly thicker deposit with 'laminal' liberation, whereby inner mass of cuprous oxide deposit is protected against weathering, thus providing extended fungicidal activity and pod protection.

Increasing the dosage is most efficient and convenient when using 'high copper' formulations such as Nordox 75WP and Nordox 75WG (75 per cent active copper). Farmers can double the normal dose of active copper using just 50 per cent more product compared to twice the amount required when they use a standard 50 per cent WP product.

Stem canker control

Neglected cocoa is prone to Phytophthora stem canker. This is an acutely more serious phase than pod rot because infections can girdle the main branches and the trunk (bole) to kill the tree. Stem canker is a serious problem in southeast Asia and Oceania where it is caused by *P. palmivora* and in West Africa where both *P. palmivora* and *P. megakarya* are responsible. Cankers may occur at the collar or just below soil level or much higher on the scaffold branches because the inoculums may originate in the soil (*P. megakarya*) or on infected pods high in the tree.

Phytophthora stem canker control requires excision of cankerous tissue followed by treatment with cuprous oxide canker paint. All diseased bark and wood and a peripheral band of healthy bark (three cm) is removed. Cleaned area is treated with paint comprising cuprous oxide and adjuvant (sticker and surfactant) and sealed with petrolatum grease. Cocoa farmers in southeast Asia achieved good results by using Nordox cuprous oxide fungicide paint with added oils and polymers added to increase tenacity, longevity and penetration into the wood. Same procedure can be used to control Erythricium (*Corticium*) salmonicolor, an equally damaging bark and wood infecting fungus causing pink disease in cocoa.

Control of Epiphytes

Algae and lichen growing on the surfaces of the leaves inhibit photosynthesis and gaseous exchange. Larger epiphytes attached to the trunk and branches increase the risk of wind damage and branch breakage. Bushy moss growth may inhibit development of the cauliflorus (truncate) cocoa flowers borne which are borne on flower cushions on the bark of the trunk and main branches. Epiphytes retain water and inhibit air circulation and thereby aggravate infection by Phytophthora. Brazilian research shows epiphytic growth on cocoa trees can harbour Phytophthora spores.

Cuprous oxide controls algae, lichens, moss, ferns and bromeliads. It also kills molluscs (slugs and snails) which damage nursery seedlings. □

—By Dr Terry Mabbett

Totally into tea

Extra efforts must be taken to improve the production and manufacturing of the second most popular drink in the world

THANK GOD FOR tea! What would the world do without tea? How did it exist? I am glad I was not born before tea. — A Chinese proverb

The popularity of tea as beverage in the world is well-known. Its popularity as beverage encompasses all age groups, geographical locations and social levels. More than 4,000mn kg was produced globally in the year 2010 out of which 1,700mn kg or 43 per cent of the total production found place in the international export market.

Though tea is produced by a large number of countries, the production is dominated by four countries — China, India, Kenya and Sri Lanka. These four countries account for more than three quarters of global production. They are sharing 71 per cent of the current export market share. In addition, countries like Vietnam and Indonesia have increased their shares substantially both in production and in export in recent times.

Indian tea, which has maintained its supremacy both in production and in export for more than a century has started to lose its pre-eminence as a result of increase in production and export of these countries. The increase in production in China has pushed India to second position. The production of China surpassed 1,000mn kg in 2006. In the export front also India has started to lose its supremacy. Its domination of export market ended first to Sri Lanka in the nineties.

The increase in export from Sri Lanka, Kenya and China has pushed India to fourth position as exporter of tea at present. However, growing domestic consumption in India has largely been compensating the loss in export. Globally, Indian tea export finds place in traditional markets like the UK, Commonwealth Nations and Germany as well as the UAE has also emerged as a major export market for Indian tea.

Long-term data on tea production and export of six major producing and exporting countries, viz. India, China, Sri Lanka, Kenya, Vietnam and Indonesia are considered for the study. The study period covers thirty-year data on production and export from 1981 to 2010 and secondary source of data are used for this purpose. Vietnam, Kenya and China were found to be more than global export growth. Also, the export growths of Sri Lanka and Indonesia were found to be 163.32 per cent and 122.23 per cent respectively from 1981 to 2010.Though the export growth of these two countries was found to be positive during last thirty years, their export growth was lower than global export growth. Among the major exporting countries, Kenya surpassed all other major tea exporting countries like India, China and Sri Lanka and retained its top position as the largest exporter of tea.

The highest estimated annual growth in production is achieved by China, which is almost double of India's annual production growth at 29mn kg. This high annual growth has contributed China to become the largest producer of tea in the world overtaking India.

It is estimated that somewhere between 60mn litres of tea is consumed daily worldwide. An extension of numbers would indicate that the USA only imports enough tea annually to keep world usage rates going for two days.

Making the leaf

Tea is made from the processed leaf of a plant whose Latin name is *Camellia sinensis*. The species name *sinensis* is Latin for Chinese. Thus, its original name, *thea sinensis*, is suggestive of the interpretation of "tea of China," perhaps because the first recorded mention of tea is from China and is dated around the year 350 C.E.

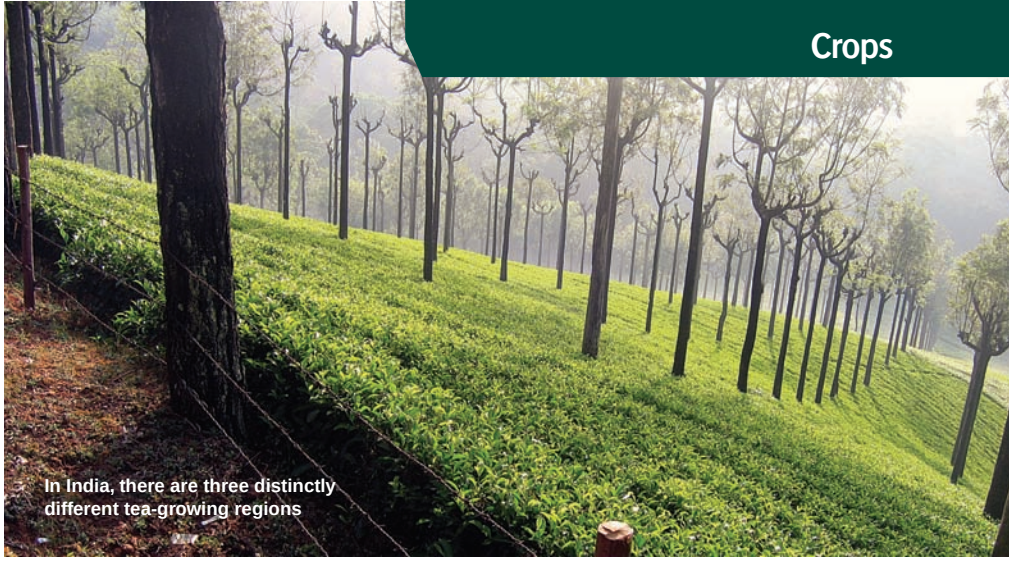
It is a stimulant since it contains caffeine. It contains fewer miligrammes of caffeine per equal-sized cup than does coffee, but more than cocoa. Tea also contains small quantities of tannic compounds technically called polyphenols, Vitamin A, B2, C, D, K, and P, plus a number of minerals in trace amounts and also aromatic oils. The tannin compounds and essential oils are, in the main, responsible for the flavour, colour, astringency (dryness), and the aromatics. The last two substances or compounds join forces to produce the high, medium and base notes of tea that one experiences. The processes of tea manufacture, by inducing physical and/or chemical changes in the leaf produce the three major types of finished tea — Green tea, which is unfermented; oolong tea, which is semi-fermented; and black tea, which is fully fermented.

The tea leaves (top two leaves and the bud leaf) are first plucked (picked) from the end of the branchlet. They are then brought to the tea manufactory where they will undergo the following processes:

The plucked leaves are placed on a withering (drying) rack. This first stage of withering may take 10 to 20 hours and its purpose is to bring down the internal moisture of the leaf to somewhere (depending upon the varital) between 60 per cent and 70 per cent of the original (at time of pluck) moisture. This reduction of moisture makes the leaf pliable and more amenable to the next step which is generally the grinding or breaking machines. These machines cut or crush the leaf for the purpose of exposing the enzymes inside of the cell to further development as a result of coming into contact with oxygen. This is called oxidation (not fermentation). The leaves begin to turn a bright copper penny colour and two or three hours is generally enough time to accomplish this. After this phase the tea goes into... the drying operation. Tea is dried (removes the balance of internal moisture until it is down to somewhere between two to seven per cent for between 30 minutes to several hours. The drying operation is exceptionally important in that this is the process, which seals in all the flavour. Following the drying operation the tea may be exposed to a static electricity roller or other process to remove unwanted leaf stem or vein fiber which adds no flavor to tea but does add additional weight.

Fermentation oxidises the leaves and changes their chemistry. In green tea manufacture, fermentation is prevented, the

Though tea is produced by a large number of countries, the production is dominated by four — China, India, Kenya and Sri Lanka


In India, there are three distinctly different tea-growing regions

constituents of the natural leaf are mostly conserved, and the character of the finished tea largely reflects that of the leaf from which it is made. In oolong manufacture, partial fermentation results in the development of some essential oil, while some of the naturally occurring oils and tannins remain unchanged. Fully fermented black tea has the highest concentration of essential oil and least resembles the natural leaf.

Tea manufacture must not only change the leaf but also stabilise those changes so that the finished leaf will not spoil. The leaves are thoroughly dried, which preserves the character of finished tea until brewing releases into the cup that balance of flavour, aroma, and stimulation created in manufacture.

Tea tasting

Most teas can be described as having a foreground (top note) flavour, middle ground flavour and background flavour. These combine to produce a 'flavour profile'. For example, there is a flavor profile into which all Darjeeling tea will fall simply because they are from Darjeeling. The reason is because all of the individual leaves of each growing region are basically identical. However, a well-balanced profile of each growing region falls within specific profile outlines.

Flavour is a combination of two sensory perceptions — taste and odour or aroma. The first part of the flavour duo of taste and aroma is perceived by the taste buds and other sensory tissues on the tongue. It is this area which perceives non-volatile stimuli such as: salt, sweet, acid (sour) and bitter. Secondly, one must consider the sense of smell when discussing what makes up flavour perception. One's sense of smell, or odour, is one's reaction to the stimulus of volatile components found in the tea which we consume. When one is swallowing tea there are volatile components present. It is these volatiles that evaporate up into the nasal cavity (retro-nasally) and stimulate the nerve endings in the olfactory bulb region.

The first commercial manufacture of tea was begun in China centuries ago. The leaves were spread about five or six inches thick on bamboo trays in a well-ventilated place. They were then poured into large bamboo trays and hand tossed 300-400 times. This operation resulted in oxidation of the leaves and turned their edges red. This slightly fermented leaf was then carried to the Kuo, a shallow iron pan let into the top of a brick stove. The leaf was roasted there and afterward poured onto flat trays to be rolled. The workman manipulated the leaves into twisted shapes by rolling them with his hands against the tray. Thoroughly rolled leaf required that he work his way around the tray at least 300-400 times. Again the leaves were carried to the Kuo and again they were roasted and rolled. This process of rolling and roasting was repeated a third time. With each rolling, fermentation proceeded a little bit more; with each roasting, fermentation was checked. The leaves were then conveyed to the 'poey long' (the fire fierce), and turned continually until they were 80 per cent dried. Old yellow leaves and stalks were picked out. The leaves were 'poeyed' again over a slow fire, turned once, and packed in chests. Tea manufacture has since been much mechanised and streamlined. Not all the procedures have direct parallels in modern methods, but if the process is less painstaking, it does not require less care and skill.

Tea leaf grading

Grading tea leaves is complicated and is done differently in different countries. The most extensive grading is found in black teas, followed by green teas. The most basic or the first grade of black tea produced is called OP or Orange Pekoe (pronounced peck-oh). Pekoe is derived from the Chinese word 'pak-Ho' meaning 'hair' or 'down' relating to the light white down on the bud leaves. One explanation for the 'Orange' half of the name is that the Chinese sometimes used Orange blossoms to flavour these leaves. Either way, today Orange Pekoe describes leaves, specifically the best, most tender leaves plucked from the tips of the plant's young shoots. Black tea is classified into four different categories: Whole leaf, broken leaf, fannings and dust.

Know the difference

After inspecting the tea, put some leaf into a glass cup and pour in some hot water. At first, the leaf will float on the surface, and then


The highest estimated annual growth in tea production is achieved by China

begin to slowly sink as it absorbs water. It will then begin to open up and show the beauty of the leaf's original appearance, and in addition, each kind of leaf will now begin to give off its distinctive colour — Qing Cha, golden yellow; Dong Ding, faint brown; Hong Cha, black tea, reddish; Lu Cha, jade green. If you use a glass tumbler or some other transparent infuser, the stages of infusion can be a splendid sight.

It is possible to get a reasonable idea of how good the tea is by looking at the stages of its infusion. You can infuse two different cups of the same kind of tea but, with different grades or brands, one cup may unfurl smoothly and secrete its colour vigorously, while the second cup, even though it is the same kind of tea, may have a similarly clear liquor but with a harsher appearance. This would indicate that the second tea is not as good as the first one.

Why are some teas expensive?

Quality is the obvious answer. Tea leaves vary tremendously in quality due to many factors.

- The species of the bush on which the tea is grown.
- The tea's growing region.
- The elevation of the estate on which the tea is grown.
- The weather conditions which existed during the growing and plucking season.
- The time of the day and year the tea was harvested.
- The age of the tea bush and the selection of leaves.
- The method of leaf plucking employed.
- The oxidation process.
- The manner in which the leaves are collected in (or from) the tea estates: the rolling, tearing and twisting of the leaves which promotes the release of natural juices and enzymes, thus ensuring proper oxidation.
- The firing or drying method used on the leaves.

The lowest grades of tea are, in the trade, commonly referred to as institutional or 'supermarket' tea. The next few grades up are generally better, but not noticeably, and are sold under a variety of generic or brand names. These grades are sold in tea bag form. Quality tea is never sold in tea bag form.

Tea is not traded as a commodity, such as coffee, but at either open or closed auctions. The more expensive the tea, the finer its quality.

In Japan, tea was mainly introduced by the ninth century Buddhist monk Saicho. For the Japanese, tea is more than just a beverage. The tea ceremony, whose aim is to help the spirit find peace, has effectively straddled centuries and borders. Via the caravan routes, tea penetrated all Mongol lands, Muslim countries and Russia before reaching Europe. Since Europe had long periods with no contact with the Orient, it, therefore, got to know about tea relatively late when it was brought by an Arab trader named Suleiman.

Early in the nineteenth century, China was virtually the sole supplier of tea in the world. In 1834, tea plantations were introduced into India and a little later, in 1857, in Ceylon and thereafter Asia, Africa and South America. As the cultivation of tea spread, the competition between ship owners for the speediest transportation of tea led to races along the Far East shipping lanes. This was the origin of the great 'Tea Clipper'.

Tea in Africa

Tea was introduced into the Botanic Gardens at Entebbe, Uganda, in 1900. This was an experimental stage of development and proved to be very successful. A G.G. Talbot established an industry there. In Kenya, the first white settlers to plant tea were brothers by the name of Orchardson. In the mid-1920s Brooke, Bond & Company purchased the land and began extensive planting.

From that point on, company after company bought land in East and West Africa, particularly East Africa, and began huge estates. Most of them have now been consolidated and purchased by large tea companies and conglomerates. The base tea seeds came from the district of Assam in northeast India. East Africa produces mostly black teas and West Africa, green teas. Kenya and Tanzania are the largest tonnage producers.

East African teas had little impact on the European market outside of England where it was used strictly as a blending tea. West African tea, the green production, made a big impact on the market in the Mediterranean countries since it was cheaper and easier to get than green China teas and in those days, India did not product green teas as it does today.

Major Tea Producing Regions In The World (1997-recent)

Region	Metric Tonnes
India	810,000
China	710,000
Sri Lanka	200,000
Kenya	175,000
Turkey	171,000
Indonesia	170,000
Japan	109,000
South America	82,000
Russia	70,000
Bangladesh	60,000
Total	2,557,000

Mineral-rich beverage

Manganese: Manganese is needed by our bodies to promote bone growth and several other developments which take place in our bodies. Among other sources, tea is one of the richest food products containing this mineral. Around five to six cups of tea daily provides us with as much as 45 to 50 per cent of our daily requirement (based on an adult intake of 2,000 calories).

Potassium: Potassium is essential to humans in that it assists in maintaining a normal heart beat. Potassium also assists nerves and muscles to function. Further, it regulates fluid levels or balance inside of each cell. A deficiency of potassium can lead to irregular heart beat and, generally, body fatigue. About five to six cups of tea daily can provide as much as 75 per cent of our daily requirements (based on an adult intake of 2,000 calories).

Tea also contains trace elements of other minerals which are in the ground (of the growing region in which the tea was harvested) and which have been deposited in the leaves via the systemic system. □

— The contributor, Souvik Sen, is asst. advisory officer at Tea Research Association in India

FAO aims to beat fatal banana disease

FAO, ALONG WITH 30 other organisations, has devised a plan to root out Fusarium Wilt, a fungus spreading from Asia to Africa and the Middle East, in order to prevent the world's most popular banana variety from disappearing. The UN body has launched a global plan to fight and contain the disease could cost US$47mn to implement.

The fungus *Fusarium oxysporum f.sp. cubense Tropical Race 4*, or TR4, has afflicted Asia for more than 20 years, affecting China, Indonesia, Malaysia and Taiwan, as well as northern Australia.

Its appearance in Mozambique in early 2013 raised the alarm of cross-continent spread, and sparked moves to devise the global plan, the main goals of which were discussed in Rome in December 2014.

A major reason for concern is that most banana plantations in Asia, Africa and South and Central America are planted with single variety — Cavendish — which is susceptible to the fungus.

Perennial, high yielding and with long green life which makes it easy to ship, the Cavendish has dominated banana production since a formerly popular variety, Gros Michel, was wiped out by Fusarium Race 1 fungus in the 1950s.

Altus Viljoen, a plant pathologist at Stellenbosch University in South Africa, said that the US$47mn figure is appropriate as 'the task ahead of us is immense.'

The Fusarium Wilt fungus blocks water-carrying vessels and produces toxins that is responsible for the plant to wilt and die

Appropriate risk assessment is also needed, not only on Cavendish plantations but for other varieties which might be susceptible to Fusarium Wilt, he added.

"We raised an alarm when TR4 was detected in the Philippines in 2005," Agustin Molina, senior scientist with Bioversity International in Asia, told *SciDev.Net.*

Its long-term experience of TR4 makes Asia the biggest player in the plan, particularly in research to find resistant varieties. The proposed funding figure includes research and development on resistant varieties. Many wild banana and plantain varieties are not edible, but they hold untapped genetic material that, with increased investment in research, could be used to make banana production more resilient to disease, the FAO revealed.

VANODINE's effective pesticide

Today VANODINE's efficacy extends to Fusarium Wilt and many other pathogens and the product is available and is now protecting southeast Asian banana plantations from the spread of such diseases.

The protection of plant and fruit species from pests, insects and fungi through the use of pesiticides is well-known, however the use of environmentally safer and more specialised disinfectants to prevent transmission of plant pathogens is perhaps much less known as one of the key methods used against the spread of plant disease.

In the early 1970s, the spread of MOKO'S disease across the banana plantations in central and Latin America was brought under control though the introduction of VANODINE disinfectant.

Regular disinfection of the tools, handling and crating equipment, coupled with vehicle and Improved plantation biosecurity programmes together brought control to a pathogen, which previously had a commercially devastating impact on the crops.

Australian scientists develop model for oil palm cultivation

SCIENTISTS IN AUSTRALIA have developed a model for oil palm cultivation, aimed at assisting growers of the crop maximise the yields of their plantations, while minimizing detrimental environmental impacts.

The model was published in the journal *Environmental Modeling & Computer software*.

"Oil palm has become a main crop in the tropics, cultivated on extra than 39mn acres of land," co-author Paul Nelson of James Cook University (JCU) said.

"Demand for the item continues to develop, and the industry is anticipated to hold expanding in the foreseeable future. At the similar time, there is considerable concern about the industry's environmental impacts, with many purchasers wanting only certified sustainable palm oil," he added.

The researchers built an oil palm system model, working with APSIM (Agricultural Production Systems Simulator) framework. The model is referred to as APSIM Oil Palm.

Application of APSIM Oil Palm will help evaluate effects of soil sort, climate and management on their water balance, nutrient balance, soil organic matter and greenhouse gas emissions

Nelson noted, "APSIM is the gold regular for simulating crop systems. It enables the simulation of systems that cover a range of plant, animal, soil, climate and management interactions. APSIM is undergoing continual improvement and it's underpinned by rigorous science and application engineering requirements.

"By applying APSIM Oil Palm, producers will be in a position to evaluate effects of their soil sort, climate and management on their water balance, nutrient balance, soil organic matter and greenhouse gas emissions."

APSIM Oil Palm can be utilised in on-farm choice creating and in assessing danger, yield forecasts and government policy, as effectively as delivering a guide to research and education.

"This is a very detailed model which involved simulating the development of oil palm stems, roots and fruit bunches, and accounting for variations in soil, light, rainfall and temperature," Nelson revealed.

The analysis was funded by the Australian Center for International Agricultural Study (ACIAR). In December 2014, the model developers ran a workshop in Jakarta, Indonesia, to train 20 scientists from six nations in making use of the model — 12 from Indonesia, three from France, two from Colombia and one from Liberia, Malaysia and the Netherlands.

Mongolia gets forest, peatland development grants

THE GOVERNMENT OF Mongolia and the Asian Development Bank (ADB) have signed letters of agreement for two technical assistance projects to establish sustainable forest management and improve management of peatlands in Mongolia. The projects, totaling US$2.4mn, are financed by grants from Japan through the Japan Fund for Poverty Reduction (JFPR).

The sustainable forest management project will benefit five districts in northeastern Mongolia.

Rising temperatures from climate change together with the large amounts of deadwood in the forest put these areas at risk of forest fires, which claim about 60,000 ha of the country's forest cover every year.

The US$2mn JFPR project will 'develop capacity for sustainable forest management from ministry to local levels', according to Ayumi Konishi, director general of the East Asia department at ADB. "It will develop capacity of community-based forest user groups, in particular women, on forest management to improve their livelihood."

The project will provide assistance to agencies managing forests, and to the forest communities that will derive income from activities that build climate resilience of the forest ecosystems. It will use technical skill training and pilot technical approaches to improve the access of forest user groups and households to income-generating activities.

The other JFPR project — backed by a US$400,000 grant — focuses on peatlands, the last wet habitats in a major part of the country. They present a host of benefits such as maintaining wet habitats and pastures, feeding rivers, preventing soil erosion, maintaining levels of groundwater necessary for forest and crop growth, and keeping wells full of water.

New farming practices can increase yields and lower pollution in China

FARMING PRACTICES IN China could be designed to simultaneously improve yields and reduce environmental damages substantially, according to a study by Stanford biology professor Peter Vitousek and a team of his colleagues at China Agricultural University.

The research paper compared current farming practices for staple crops corn, wheat and rice in eastern and southern China to three alternative approaches:

- Incremental improvements of the current method, aimed at boosting crop growth
- A yield-maximising approach with no regard to either financial or environmental costs
- An 'integrated soil-crop system management' (ISSM) approach that used crop models to redesign the production system

The integrated soil-crop system approach aims to tailor decisions like crop selection, planting, sowing, and nutrient management to each field's conditions in order both to enhance yields and to minimise environmental damage.

Nitrogen fertiliser is used extensively in modern agriculture — and nowhere more than in China. Overall, Chinese farmers overuse fertiliser, with much of it ultimately polluting the air and water and contributing to hundreds of thousands of premature deaths each year. The production and transport of fertiliser also contributes significantly to agriculture's share of greenhouse gas emissions that fuel climate change.

In total, the team tested the four farming methods in 153 site-years of experiments between 2009 and 2012 in widely distributed sites within China's regions of intensive agriculture. Of the four methods, the yield-maximising approach produced the highest yields of corn, wheat and rice. Yields from ISSM treatment were a close second, reaching 97-99 per cent of the levels seen in yield-maximising fields. Crops grown in the ISSM approach also required much less fertiliser, and used it much more efficiently, resulting in nearly no wasted nitrogen and significantly lower greenhouse gas emissions.

Vitousek said, "If we can combine much higher yields with much lower environmental consequences in China, there is real hope that those challenges can be met around the world."

The authors predict that if farmers can reach even 80 per cent of the yields seen in the study's ISSM test fields by 2030 (when China's human population will reach its peak), on the same amount of land that Chinese farmers cultivated in 2012, grain production could then meet demand for both human and animal consumption.

Philippines to increase sugarcane production through genomics

THE PHILIPPINES SUGARCANE industry is aiming to increase the sugarcane productivity by using high-yielding variety through the Sugarcane Genomics Project, representatives of the Philippine Genome Center (PGC) of the University of the Philippines said.

Agriculture project directors Rita Laude and Antonio Laurena of the PGC added that genomics is potential to agriculture.

The researchers are focusing on studying sugarcane genes and DNA extraction from SRA for analysis, for more high-yielding varieties for sugarcane, and for the development using genetic markers, in collaboration with the SRA.

With genomics, sugarcane productivity could surpass 100 metric tonnes per hectare yield in the country

Laurena said that, with genomics, sugarcane productivity could surpass a 100 metric tonnes per sugarcane hectare yield.

"Genomics contributes in increasing productivity of sugarcane, through developing high-yielding varieties," he added.

Aside from sugarcane, the agriculture, livestock, fisheries programme of the PGC is also working on research projects towards the improvement of other crops such as abaca, coconut, and pili, as well as the characterisation of diagnostic tools, such as for shrimp diseases.

The PCG, which is directly under the Office of the President, is a multi-disciplinary institution that combines basic and applied research for the development of health diagnostics, therapeutics, DNA forensics and preventive products, and improved crop, aquaculture, and animal varieties.

Meanwhile, the Philippines agricultural department has introduced new fertiliser technologies to Aurora corn farmers.

"From now on we will never be affected with expensive fertilisers, instead we will make our own fertilisers using the things we have in our surroundings," said Nilo Arena, one of the participants of the Farmers Field School (FFS) on Integrated Pest Management on Corn with Emphasis on Organic Farming.

A total of 32 corn farmers recently successfully finished the FFS and are now equipped with new technologies for corn production in Barangay Resthouse, Aurora, Zamboanga del Sur.

During the programme, agricultural programme coordinating officer of DA Carlito Larubis said that organic farming should be practiced again for everyone to have safe food to eat.

Vietnam to promote itself as ‘macadamia kingdom’

VIETNAM’S COFFEE BELT could switch to growing macadamia as an alternative crop, the *Vietnam Economic Times* newspaper reported, quoting agricultural and banking experts at a seminar.

Lien Viet Post Joint Stock Commercial Bank (LienVietPostBank) will lend US$865mn to the Him Lam Company for a macadamia cultivation project in the country’s Central Highlands.

The money will be invested in the first phase of the project to grow macadamia plants on 100,000 ha of land by 2020.

It is expected that another US$865mn will be invested in the project’s second phase to expand the area for cultivating the plant to 200,000 ha between 2020 and 2024.

This is the first project to grow macadamias on a large scale in Vietnam. The Him Lam Company will supply farmers with seeds, fertiliser, and plant protection products and will teach them proper planting techniques.

The macadamia nut is dubbed the ‘Queen of Nuts’ for its outstanding nutritional value and high concentration of mono-unsaturated fats.

The plant, indigenous to Australia, was introduced to Vietnam in 2002 for trial cultivation in some central provinces including Lam Dong, Dac Nong and Dac Lac. After more than 10 years under trial cultivation, it was found that Vietnam produced a higher yield of macadamias than other countries.

Local scientists have tested and found that the northwestern and Central Highlands regions have conditions best suited for the plant's growth.

By September 2014, the plant covered 1,600 ha in the Central Highlands region.

Macadamia has a longer production life and the prices of the nuts, used in confectionery products, are higher than that of coffee

However, a representative from LienVietPostBank told online news *portal nld.com.vn* that the plant is now growing spontaneously. He said that the project aims to turn the plant into a key industrial plant in the Central Highlands region, attract a stable source of income for the farmers and turn the region into a ‘macadamia kingdom’ in southeast Asia.

Technology aiding agricultural processes

Farming processes are heading down the path of automation, as robots are making an increasingly important presence in agriculture

JAPANESE COMPANIES HITACHI-ZOZEN, Hitachi and Yanmar have been commissioned to conduct a study on whether positioning signals from Japan's Quasi-Zenith Satellite System (QZSS) can be effectively used for precision farming in Australia. Demo tests are being executed using the signals to control a self-steering robotic tractor and perform farmwork in a paddy field.

The study, by employing a new method, aims to enhance positioning accuracy. It will engage in precise point positioning with ambiguity resolution (PPP-AR), using Australia's electronic datum points to make it possible to perform accurate farm work with an error of five centimetres. The first demonstration test, conducted in late November 2014 during the growth stage of rice, succeeded in controlling the self-steering robotic tractor so that its tyres ran between rows of planted rice.

In January 2015, the tractor was used to monitor growth conditions. However, the study will continue with the tractor performing several aspects of farm work at different timings. Following the study, farm workers and government officials will be interviewed to identify the challenges of commercialising precision farming employing advanced positioning signals.

Eventually, a consortium centred on the three commissioned companies will be formed to actively promote precision farming. Plans include further enhancing the accuracy of positioning data, applying the technology to other programs, and expanding services to regions other than Australia, such as Japan and other parts of Asia.

Scientists have designed a self-steering robotic tractor, which can sow, plough and spray crops. An advanced positioning signal is transmitted from Japan's Quasi-Zenith Satellite System to control the tractor's movements. The government is funding trials to test the tractor on crops at Rice Research Australia near Jerilderie in southwest New South Wales. Engineering firm Hitachi Zosen, machine manufacturer Yanmar, Hokkaido University and several other Australian universities are working together on the project.

Phil Collier, research director at Australia's Co-operative Research Centre for Spatial Information, hopes the technology can help farmers run their equipment with more accuracy. "The satellites in the sky determine the position of the tractor in a global frame of reference. The additional information that comes from the QZSS Satellites brings the precision down from several metres to two centimetres.

The objective is to bring down the precision to a reliable and consistent level to allow that tractor to navigate its way down the rows of crops so things aren't getting run over. If the trials prove successful, people in rural and remote Australia will have access to precise positioning, without having to rely on the mobile network.

At the moment, the robotic tractor is being tested on rice crops and paddocks late at night and into the early hours of the morning, when the satellite is passing over Australia. The boundary of the field, the tractor's path and the start and end point of where it can turn are all programmed on a computer inside its cab. This is to ensure the tractor doesn't veer off into a fence or an irrigation channel.

The Japanese government intends to deploy another three satellites in the near future, which will give Australia 24 hour coverage of the advanced positioning signals, once the technology is commercialised.

According to Phil Collier from CRC, the technology application won't be limited to precision farming. "From mining to automated guidance of cars, anything where there's a level of machine automation required that's outside, then this technology has got that ability to solve that problem.

Collier predicts that this sort of technology will move from sophisticated installations in machines like this to mobile phones in due course and eventually, "people will have it in their back pocket".

A self-driven tractor at work

A robot that extracts breast fillet

Researchers working on the CYCLE project are exploring the functionality of a robot that is designed to automate the process of extracting breast fillets from chickens – a task normally performed by skilled human hands.

"Our aim is to automate absolutely everything we can think of on the food production line," said Ekrem Misimi at SINTEF.

This is the first time the process has been automated, stated Misimi. It will make Norwegian food production more sustainable, both in terms of profitability and utilisation of raw materials. So far, one of the results is the robot Gribbot, named because of its resemblance to a vulture's beak ('gribb' is Norwegian for vulture). Gribbot has a hand for grasping, specially-developed fingers, and 3D vision. Its "eyes" have been borrowed from a 3D camera of the Microsoft Kinect 2. These are all needed because a chicken fillet must be handled with care. The robotic hand must not spoil it with marks or other quality defects. Its a challenge to get a robot to process biological raw materials. In addition, the smooth texture of a chicken fillet makes it highly reflective, making it difficult to obtain fully detailed 3D images. The texture also means that the meat is hard to grip.

The idea is to continue developing Gribbot as part of future projects, so that it will be possible to make use of any meat that may be left on the chicken carcass after the fillet has been 'harvested' by the robot. □

Cablevey Conveyor mechanical systems eliminate product separation in feed

US-BASED CABLEVEY Conveyors develops mechanical systems used to convey feed mill materials and to feed livestock.

Based on its patented disc technology, the conveyors gently move products such as mash, vitamins, minerals and feed pellets through an enclosed tube without using air. This approach virtually eliminates the product separation and degradation that occur with traditional conveying systems such as screw augers and pneumatic systems.

In order to feed fowl, Cablevey Conveyors' feeding system allows users to out-feed ingredient distribution and with a charged feed line – there's feed in every pan when the system starts.

The systems provide adequate feed space so all birds eat at the same time and help eliminate migration. High-speed feed delivery occurs with virtually no feed separation. The systems improve production and hatchability.

The systems are customised according to usage – 2000 Series System which has a two-inch (50mm) diametre tube. It conveys up to 2.12 cu/m per hour. The 4000 Series System is a four-inch (100mm) diametre tube. It conveys up to 14.87 cu/m per hour and the 6000 Series System is a six-inch (150mm) diametre tube, which conveys up to 35 cu/m per hour.

Cablevey Conveyors at work

Headquartered in Iowa, Cablevey's products are used in processing facilities throughout the USA and more than 65 countries around the world.

Indian company Escorts launches country's first anti-lift tractors

INDIAN TRACTOR MANUFACTURER Escorts Ltd has launched the country's first anti-lift tractors in the Powertrac Euro series.

Tractors in general are vulnerable because of their front-lift nature, resulting in reduced or no steering of front wheels. This endangers the safety of the driver and results in considerable damage which increases the maintenance cost for the owner, the company said in a statement. The tractors will benefit from innovative technology developed by Escorts with improvements seen in front-lift resistance capacities.

Escorts R&D has developed an innovative technology through a series of measures such as shifting the center of gravity and hitch point forward, unique hub-reduction transmission, increased wheel base, heavy front axle, stiffener bars and plates, custom-designed 85kg front bumpers and high-intensity extra front lamps.

Shenu Agarwal, vice-president, head of knowledge management centre (R&D), Escorts Agri Machinery, said, "Our anti lift tractor brings freedom from drudgery and life threatening situations for the driver while offering never before value for money to the tractor owner."

The tractors are priced between US$8,575 and US$9,050 and are available in two variants — LT4000 and ALT3500 — offering 37HP and 41HP respectively.

SP Pandey, chief general manager and market lead of Powertrac, Escorts Agri Machinery, added, "No tractor company has endeavored before to ameliorate the hapless driving conditions experienced by the haulage operators, particularly in mining and transportation. Currently, while driving up a gradient, tractor tends to dance with a fully loaded trailer hitched to it, thereby putting the life of driver and his helper in precarious condition. Increased wear and tear and accidents also increase the inefficiencies for the tractor owner."

The tractor comes with certified fuel-efficient engine, haulage-special low-wear rear tyres, four-coat high-life yellow paint, long life oil brakes, and 20 per cent bigger fuel tank.

Escorts Ltd is selling the new tractors in the Indian states of Uttar Pradesh, Maharashtra, Madhya Pradesh, Seemandhra, Telangana, Chhattisgarh, Jharkhand and Bihar.

The tractors are available in two variants - LT4000 and ALT3500

Poultry Buyers' Guide 2015

Section One - 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 One

All Equipment
Evolution Vaccination Technology
Henke-Sass, Wolf GmbH

Breeding Equipment
Evolution Vaccination Technology

Cages - breeder
Big Dutchman International GmbH

Cages - broiler
Big Dutchman International GmbH
Jansen Poultry Equipment

Cages - brooder and rearing
Big Dutchman International GmbH

Cages - layer
Big Dutchman International GmbH

Climate Systems
Big Dutchman International GmbH
Termotecnica Pericoli

Computer Systems
Big Dutchman International GmbH

Disinfection Equipment
Impex Barneveld b.v

Disinfection Products
Intraco Ltd. n.v

Egg Collection, Handling and Transport
Big Dutchman International GmbH
Jansen Poultry Equipment
Lubing Maschinenfabrik GmbH & Co. KG

Environment Controls
Termotecnica Pericoli

Evaporative Cooling Systems
Big Dutchman International GmbH
Lubing Maschinenfabrik GmbH & Co. KG
Termotecnica Pericoli

Exports
Eurofeed Technologies S.p.A.
Henke-Sass, Wolf GmbH

Feed
Eurofeed Technologies S.p.A.

Feed Additives
Eurofeed Technologies S.p.A.
Intraco Ltd. n.v
Tithebarn Ltd.
unipoint AG

Feed Additives, Natural
Ayurvet Ltd.
Eurofeed Technologies S.p.A.
HAMLET PROTEIN AS
unipoint AG

Feeds, Concentrates, Premixes
Ayurvet Ltd.
Eurofeed Technologies S.p.A.
HAMLET PROTEIN AS
Intraco Ltd. n.v

Feed Ingredients
Eurofeed Technologies S.p.A.
Intraco Ltd. n.v
unipoint AG

Feeding Systems
AWILA Anlagenbau GmbH
Big Dutchman International GmbH
Impex Barneveld b.v

Fogging Equipment
Big Dutchman International GmbH
Impex Barneveld b.v
Lubing Maschinenfabrik GmbH & Co. KG

Handling Equipment
Evolution Vaccination Technology

Hatchery Supplies and Services
Evolution Vaccination Technology

Hatching and Incubation
Impex Barneveld b.v

Health Control
Evolution Vaccination Technology
Henke-Sass, Wolf GmbH

Heat Control Systems
Big Dutchman International GmbH
Evolution Vaccination Technology
Termotecnica Pericoli

Health Products
Ayurvet Ltd.
Evolution Vaccination Technology
Henke-Sass, Wolf GmbH
Socorex Isba SA

Housing
Big Dutchman International GmbH
Intraco Ltd. n.v
Jansen Poultry Equipment

Medicators
Henke-Sass, Wolf GmbH
Impex Barneveld b.v
Lubing Maschinenfabrik GmbH & Co. KG

Mould Inhibitors
Ayurvet Ltd.
Eurofeed Technologies S.p.A.

Nests and Nesting Systems
Big Dutchman International GmbH
Impex Barneveld b.v
Jansen Poultry Equipment

Processing - Killing and Defeathering
Marel Stork Poultry Processing

Salmonella Control
Eurofeed Technologies S.p.A.
Evolution Vaccination Technology

Sanitation
Intraco Ltd. n.v

Slaughtering Equipment
Marel Stork Poultry Processing

Turkey
Marel Stork Poultry Processing

Ventilation Equipment
Big Dutchman International GmbH

Veterinary Instruments
Evolution Vaccination Technology
Henke-Sass, Wolf GmbH
Socorex Isba SA

Veterinary - Sprayers
Evolution Vaccination Technology

Veterinary - Vaccinators
Evolution Vaccination Technology
Henke-Sass, Wolf GmbH
Socorex Isba SA

Watering Equipment
Big Dutchman International GmbH
Impex Barneveld b.v
Lubing Maschinenfabrik GmbH & Co. KG

Section Two

AWILA Anlagenbau GmbH
Dillen 1, Lastrup
49688
Germany
Tel: +49 4472 8920
Fax: +49 4472 892220
Web: www.awila.de
E-mail: info@awila.de

Planning, design and erection of turn-key feed mills, grain silo plants, mineral and vitamin premixing and dosing systems, pasteurising systems, biofuel processing equipment. Production of intakes conveyor-system, storage systems, mills, mixers, presses, coolers, conditioners and control systems.

Ayurvet Ltd.
6th Floor, Sagar Plaza
Distt. Centre, Laxmi Nagar
Vikas Marg, Delhi
110092
India
Tel: +91 90 13474749
Fax: +91 11 22455991
Web: www.ayurvet.com
E-mail: pverma@ayurvet.com

Ayurvet Limited is a leading manufacturer and exporter of natural animal healthcare products for poultry, dairy, pigs, aqua, equine and pets. We have solutions for current age problems like alternative to antibiotics, natural anti-coccidials, growth promoters, anti-mastitis, natural toxin binders & immunomodulators for food animal production. Our world class manufacturing unit is ISO 9011, WHO-GMP and EU-GMP Certified. Contact us for more info and distributorship in your country.

Agents:
Bangladesh - ACI, Bangladesh
Malaysia - Yenher Agro Products Sdn
Taiwan - J. John Industry Co. Ltd.
Thailand - American Marketing Co. Ltd.

Big Dutchman International GmbH
PO Box 1163, Vechta
49360
Germany
Tel: +49 444 78010
Fax: +49 444 7801237
Web: www.bigdutchman.de
E-mail: big@bigdutchman.de

Agents:
Bangladesh - AFS Enterprise
China - Big Dutchman (Tianjin) Livestock Equipment Co. Ltd.
India - Big Dutchman India Pvt. Ltd.
Indonesia - Aneng Gunawan Lim (BD-ML)
Indonesia - PT BD Agriculture Indonesia
Japan - Masahiro Sumiya
Japan - Nakajima Seisakusho Co. Ltd.
Japan - Tohzai Sangyo Boeki Inc.
Korea - Ganong International Co. Ltd.
Korea - Jeong Jin Soo
Korea - Samsung MS
Malaysia - BD Asia Sdn Bhd
Pakistan - Eastern Veterinary Services
Philippines - Asia Giant Enterprises
Singapore - Morgan Enterprise
Taiwan - Bartholomew Lo, Siu-Man
Taiwan - Global Ace Trading Co.
Thailand - BD Agriculture (Thailand) Ltd.
Vietnam - Big Dutchman Vietnam HCM Rep.
Vietnam - P & N Agro Business Co. Ltd.

Eurofeed Technologies S.p.A.
Via L. Einaudi, 12, Loc. Bettolino
Brandico (BS), Italy
Tel: +39 030 6864682
Fax: +39 030 6866560
Web: www.eurofeed.it
E-mail: info@eurofeed.it

Eurofeed Technologies S.p.A. is an Italian company that produces and trades feed additives all over the world. We are GMP Certified. Eurofeed Technologies' portfolio includes the following additives as Acidifiers, Antioxidants, Antimicrobials, Aromas, Mould Inhibitors, Mycotoxin Binders, Natural Diarrhea Preventions, Nutraceutical Feed Supplements, Pellet Binders, Trace Mineral Chelateds, Vegetable Protein Concentrate.

Evolution Vaccination Technology
Shirehill Industrial Estate, Thaxted Road
Saffron Walden, CB11 3AQ
United Kingdom
Tel: +44 1799 523588
Fax: +44 1799 513381
Web: www.evolutionvaccination.com
E-mail: info@evolutionvaccination.com

Manufacturers of ultra reliable, easy to use vaccination equipment.

Agents:
China - Guangdong Huimu Trade Co. Ltd.

HAMLET PROTEIN AS
Saturnvej 51, Horsens
8700, Denmark
Tel: +45 75 631020
Web: www.hamletprotein.com
E-mail: info@hamletprotein.dk

The highly digestible protein in our product HP AviStart helps give chicks the very best start!
HP AviStart is a unique protein source made by co-processing soy and yeast.
Compared to standard soy proteins, it contains a very low level of the anti-nutritional factors that limit the absorption of feed nutrients.

Agents:
Thailand - Jebsen & Jessen Ingredients

Henke-Sass, Wolf GmbH
Keltenstraße 1, Tuttlingen
78532, Germany
Tel: +49 7462 9466118
Fax: +49 7462 94665208
Web: www.henkesasswolf.de
E-mail: stefan.knefel@henkesasswolf.de

Henke-Sass, Wolf (Tuttlingen/Germany) is a leading manufacturer with more than 90 years of experience in designing and producing veterinary syringes, needles and application systems.
Everything for the poultry users from one source!
Single/double automatic vaccinator for day-old chicks: enables injection of two different vaccines with only one penetration.
HSW UNI-MATIC® - 0,1 ml- 1 ml; no o-ring to reduce maintenance issues; failure free valves ensure injections without interruption.
HSW FINE- JECT® disposable needles-extra short sizes e.g. 18Gx1/2", 20Gx1/4", 22Gx3/8".
HSW ECO® needles- re-usable metal hub needles; extra short sizes e.g.19Gx1/2", 20Gx1/2".
Wing Web Vaccinators- ideal for pox and other micro-dosage injections; enables a total dosage per vaccinator of 0.001 ml and 0.01 ml.

Agents:
Indonesia - Pesona Scientific
Korea - Yushin Corporation
Philippines - P & J Agricultural Trading
Taiwan - Ennchih Co. Ltd.

Impex Barneveld b.v
PO Box 20, Harslelaarseweg 129
3771 MA Barneveld, 3770 AA
The Netherlands
Tel: +31 342 416641
Fax: +31 342 412826
Web: www.impex.nl
E-mail: info@impex.nl

Impex Barneveld b.v is a pioneer and specialist in drinking equipment for poultry, pigs and livestock. Impex automatic AGRILAND® drinking systems originate from the need for efficient animal breeding automation and are perfected by our technical staff with more than 45 years of experience in the coordination of automation for poultry and pig management.

Intraco Ltd. n.v
Jordaenskaai 24, Antwerp
2000, Belgium
Tel: +32 3 2269850
Fax: +32 3 2269852
Web: www.intraco.be
E-mail: intraco@intraco.be

Jansen Poultry Equipment
Harselaarseweg 32
MB Barneveld
3771, The Netherlands
Tel: +31 342 427000
Fax: +31 342 427001
Web: www.jpe.org
Email: info@jpe.org

Jansen Poultry Equipment was founded in 1986 for development and production of the first automatic laying nests. With his knowledge of technology and poultry, Mr Jansen succeeded in developing the most sought-after laying nest. Today the company offers a wide range of poultry systems and has grown to become a flourishing international company with its headquarters located in the Netherlands.

Lubing Maschinenfabrik GmbH & Co. KG
Lubingstrasse 6, Barnstorf, 49406
Germany
Tel: +49 5442 98790
Fax: +49 5442 987933
Web: www.lubing.com
E-mail: info@lubing.de

LUBING, German company since 1949, is specialized in developing and manufacturing:
- Complete Drinking-Systems for broilers, breeders, layers, pullets, ducks, turkeys etc.
- Conveyor-Systems for save egg transportation without using transfers
- Climate-Systems for cooling, humidifying and dust-controlling with the Top-Climate-Systems (high pressure fogging) or Pad-Climate-Systems (Pad cooling).

Agents:
China - Lubing Sysytem Engineering (Shenzhen) Co. Ltd.
India - Lubing India Pvt. Ltd.
Indonesia - PT. Charoen Pokphand Indonesia
Japan - Hytem Co. Ltd.
Malaysia - Malaysia Tong Seh Industries Supply Sdn Bhd
Pakistan - Ample Trade Impex
Thailand - KSP Equipment Co. Ltd.
Vietnam - Dong A Material-Veterinary JSC

Marel Stork Poultry Processing
PO Box 118, Boxmeer
5830 AC, The Netherlands
Tel: +31 485 586111
Fax: +31 485 586222
Web: www.marel.com/poultry
E-mail: info.poultry@marel.com

Marel Stork Poultry Processing is global supplier of dedicated poultry processing equipment, providing innovative inline solutions for all process stages and capacity levels. The product range includes live bird supply, stunning, killing, scalding, de-feathering, evisceration, giblet harvesting, chilling, grading, cut-up, deboning, X-ray bone detection, portioning, production software and service contracts.

Agents:
Australia - Marel Stork Food Systems Australasia (Pty) Ltd.
Bangladesh - Axon Ltd.
China - Marel Stork Food Systems China Co. Ltd.
Indonesia - Marel Stork Indonesia
Japan - Marel Japan Co. Ltd.
Malaysia - Advance Farm Systems (M) Sdn Bhd
Malaysia - Advance Farm Systems (M) Sdn Bhd-Marel
Philippines - Marel Stork Asia
Philippines - Vemaval Incorporated
Singapore - Advance Farm Systems Pte Ltd.
Sri Lanka - Bodum Aussenhandels GmbH
Taiwan - Ever Prima Co. Ltd.
Thailand - K-Plus Engineering Co. Ltd.
Vietnam - Peja Vietnam

Socorex Isba SA
Champ-Colomb 7
Ecublens/Lausanne
1024
Switzerland
Tel: +41 21 6516000
Fax: +41 21 6516001
Web: www.socorex.com
E-mail: socorex@socorex.com

Swiss manufacturer of self-refilling syringes, designed for precision serial animal injections covering all needs in poultry and other fields. Feed tube and vial models ranging 0.025 to 10ml. Twin syringes (simultaneous injection of distinct liquids) ranging from 0.025 to 5ml. Socorex's dedication to quality is an all-time tradition.

Termotecnica Pericoli
Regione Rapalline 44
Albenga (Sv)
17031
Italy
Tel: +39 0182 589006
Fax: +39 0182 589005
Web: www.pericoli.com
E-mail: termotecnica@pericoli.com

Termotechnica Pericoli: A global market leader specialized in climate technology since 1967 in design, manufacture and distribution of efficient/quality heating, cooling and ventilation equipment and systems for livestock, agricultural and industrial sectors with a full range of products to meet all specifications and applications backed by an extensive qualified global distribution network.

Agents:
Malaysia - Pericoli Asia Pacific

Tithebarn Ltd.
Road 5, Industrial Estate
Windsford, Cheshire
England, United Kingdom
Tel: +44 1606 595000
Fax: +44 1606 595045
Web: www.tithebarn.co.uk
E-mail: export@tithebarn.co.uk

unipoint AG
Gewerbestrasse 2
Ossingen, CH-8475, Switzerland
Tel: +41 52 3052041
Fax: +41 52 3052042
Web: www.unipoint.ch
E-mail: info@unipoint.ch

Klinofeed®: The unique feed-additive with a high capacity to bind Ammonium and Mycotoxins. Klinofeed is also a highly effective pellet binder. Klinofeed is the original product, EU-registered by unipoint AG, as feed additive No.: 1g568. Please ask us about Klinofeed: info@unipoint.ch

Section Three

Australia

Marel Stork Food Systems Australasia (Pty) Ltd.
Unit 1
53 Neumann Road
Capalaba
4157
Tel: +61 7 39003000
Fax: +61 7 39003033
Web: www.marel.com/australia/
E-mail: info@marel.com

Bangladesh

ACI, Bangladesh
ACI Centre 245
Tejgaon Industrial Area
Dhaka
1208
Tel: +880 17 14000184
Fax: +880 2 8878626
Web: www.aci-bd.com
E-mail: shaheenshah@aci-bd.com

AFS Enterprise
Banani
Dhaka, 1213
Tel: +880 2 8858404
Fax: +880 2 9858547
E-mail: wasusalam@hotmail.com

Axon Ltd.
Apt. 18
House 541
Road - 12
Baridhara DOHS
Dhaka, 1206
Tel: +880 2 8417331
Fax: +880 2 8417330
E-mail: info@axon-group.net

China

Big Dutchman (Tianjin) Livestock Equipment Co. Ltd.
No. 21, Yuan Shuang Road
Beichen EDZ, Tianjin, 300400
Tel: +86 22 26970158
Fax: +86 22 26970157
Web: www.bigdutchman.org.cn
E-mail: bdchina@bigdutchman.com

Guangdong Huimu Trade Co. Ltd.
No. 15 & 16
Commercial Service Building C5
Wens Technology Park
No. 3 Dongti Bei Road,
Xincheng Town, Xinxing County
Yunfu City, Guangdong Province
Tel: +86 20 38468716
Fax: +86 20 38498106
Web: www.gddhn.com
E-mail: 2919836042@qq.com

Lubing Sysytem Engineering (Shenzhen) Co. Ltd.
Song Ming Industrial Park
Gongming Town
Guangming District
Shenzhen City
Guangdong, 518106
Tel: +86 755 27411888
Fax: +86 755 27411124
Web: www.lubcn.com
E-mail: tjlim@lubing.cn

Marel Stork Food Systems China Co. Ltd.
Caiyuan Industrial Zone No. 16
Nancai Town
Shunyi District
Beijing, 101300
Tel: +86 10 89472150
Fax: +86 10 89472350
E-mail: china.poultry@marel.com

India

Big Dutchman India Pvt. Ltd.
No. 8-2-293/82/A/666
Road No. 34, Jubilee Hills
Hyderabad, 500033
Tel: +91 4033163112
E-mail: bdindia@bigdutchman.com

Lubing India Pvt. Ltd.
271/P/B, Ingawale Patil Estate
Bhugaon, Paud Road
Tal Mulshi, Pune
Maharashtra, 411 042
Tel: +91 20 2952404
Fax: +91 20 22952403
Web: www.lubingindia.com
E-mail: info@lubingindia.com

Indonesia

Aneng Gunawan Lim (BD-ML)
Pergudangan Prina Center 2
Unit E. No. 9
Jakarta, 11710
Tel: +62 21 29031020
Fax: +62 21 29030955
E-mail: alim@bigdutchman.com

Marel Stork Indonesia
Stork House
Jalan Rawa Pandan No. 19 B
Tomang Raya
Jakarta, 11430
Tel: +62 21 56974008
Fax: +62 21 56959071
E-mail: indonesia.poultry@marel.com

Pesona Scientific
Komplek Kopo Mas Regency
Bandung, ID-40225
Tel: +62 22 5430583
Fax: +62 22 5430314
E-mail: cvpesona@bdg.centrin.net.id

PT BD Agriculture Indonesia
Pergudangan Prima Center 2
Unit E No.9
Jl.Pool PPD Pesing
Poglar RT. 010/002 Kel.
Kedaung Kali Angke
Jakarta, 11710
Tel: +62 21 29031020
Fax: +62 21 29030955
E-mail: bdai@bigdutchman.com

PT. Charoen Pokphand Indonesia
Poultry Equipment Division
Jl. Raya Serang Km. 30
Balaraja
Tangerang, 15610
Tel: +62 21 5951012
Fax: +62 21 5951013
Web: www.lubing.com
E-mail: antoni@cpi-pe.co.id

Japan

Hytem Co. Ltd.
2-10 Techno Plaza
Kakamigahara City
Gifu, 509-0109
Tel: +81 58 3850505
Fax: +81 58 3851230
Web: www.hytem.com
E-mail: info@hytem.com

Marel Japan Co. Ltd.
162, Morita Takuchi
Okubo, Akashi City
Hyogo, 674
Tel: +81 78 9341610
Fax: +81 78 9340204
E-mail: info.poultry@marel.com

Masahiro Sumiya
5-18-3-1402
Minamikasai, Edogawa-Ku
Tokyo, 1340085
Tel: +81 3 59397061
Fax: +81 3 59397061
E-mail: sumiya@bigdutchman.com

Nakajima Seisakusho Co. Ltd.
Nagano City, 33 Ai Shinonoi
Nagano Pref., 388-8004
Tel: +81 262 921203
E-mail: info@nakamatic.co.jp

Tohzai Sangyo Boeki Inc.
2-Chome, 17-18 Yushima
Bunkyo-Ku
Tokyo, 113-0034
Tel: +81 3 38154491
Fax: +81 3 38154456
E-mail: it@tohzai-sangyo.co.jp

Korea

Ganong International Co. Ltd.
349-1 Cheonhyun-Dong
Hanam-shi, Kyunggi-Do
South Korea, 465-816
Tel: +82 23 4366790
Fax: +82 31 7926305
E-mail: starmanpark@hanafos.com

Jeong Jin Soo
486-18 Ui-Green Villa 6-202
Ssangmun-dong
Dobong-ku, Seoul
Tel: +82 10 52174518
E-mail: jeong@bigdutchman.com

Samsung MS
29-23, Bakdalro 275gil
Anyang-si, Kyunggi-do
430-849
Tel: +82 31 4037291
Fax: +82 31 4037295
E-mail: ds2hns@hanmail.net

Yushin Corporation
7F, 751 Bldg.
Kangnam-Ku
KR Seoul, 135-010
Tel: +82 2 5682525
Fax: +82 2 5693113
E-mail: ryushin@netsgo.com

Malaysia

Advance Farm Systems (M) Sdn Bhd
CT-6-19, 6th Floor Subang Square Jalan SS15/4G
Subang Jaya
Selangor Darul Ehsan
47500
Tel: +60 3 56363204
Fax: +60 3 56362784
E-mail: adv-ps@streamyx.com

Advance Farm Systems (M) Sdn Bhd-Marel
46, Lorong Nagasari 11
Taman Nagasari
Prai Industrial Estate
Prai, Pulau Pinang
13600
Tel: +60 4 3995157
Fax: +60 4 3909578
E-mail: info.poultry@marel.com

BD Asia Sdn Bhd
No. 20, Lorong Keluli 1B
Kawasan Perindustrian
Bukit Raja
Shah Alam
Selangor
40000
Tel: +60 3 33615555
Fax: +60 3 33422866
E-mail: bdasia@bigdutchman.com

Malaysia Tong Seh Industries Supply Sdn Bhd
Lot 780, Block A
Jalan Sg.
Putus, Off Jalan Kapar
3 3/4 Miles
Klang, Selangor
42100
Tel: +60 3 32916958
Fax: +60 3 32915198
Web: www.tongseh.com.my
E-mail: enquiry@tongseh.po.my

Pericoli Asia Pacific
14 Jalan Sejahtera 25/124
Axis Premier Industrial Park
Sector 25
Shah Alam
Selangor
40400
Tel: +60 3 51223880
Fax: +60 3 51225899
Web: www.pericoli.com
E-mail: termotecnica@pericoli.com

Yenher Agro Products Sdn
1628, Jalan IKS Simpang Ampat, Taman IKS Simpang Ampat 1, Simpang Ampat
S.P.S. Pulau Pinang
14100
Tel: +60 12 4023167
Fax: +60 4 5880928
Web: www.yenheragro.com
E-mail: phong.vet@yenheragro.com

Pakistan

Ample Trade Impex
Suit #3, 3rd floor,
Sumak Centre, 1-D, Commercial
DHA Lahore-EME Sector
Lahore
Tel: +92 42 7584400
Fax: +92 42 7532102
Web: www.lubing.com
E-mail: ample@nexlinx.net.pk

Eastern Veterinary Services
Office 7, 2nd Floor
Allied Commercial Plaza
Chandi Chowk, Murree Rd
Rawalpindi, Punjab
46000
Tel: +92 51 4421771
Fax: +92 51 4421776
E-mail: estrnbio@dsl.net.pk

Philippines

Asia Giant Enterprises
Unit 403, Gold Hill Tower
San Juan, Metro Manila
1500
Tel: +63 2 7236347
Fax: +63 2 7253942
E-mail: bengo@asiagiantgroup.com

Marel Stork Asia
#1 Langka Road, FTI Complex
Taguig, Metro Manila
Tel: +63 2 8383912
Fax: +63 2 8383913
E-mail: asia.poultry@marel.com

P & J Agricultural Trading
184, St. Antonio Ave., Manila
Tel: +63 2 6410053
E-mail: boddy@pjagri.net

Vemaval Incorporated
#1 Langka Road, FTI Complex
Taguig, Metro Manila
Tel: +63 2 8384647
Fax: +63 2 8384540
E-mail: vemaval@info.com.ph

Singapore

Advance Farm Systems Pte Ltd.
No. 57, Ubi Avenue 1
#07-1
Ubi Centre, 408936
Tel: +65 67486613/17
Fax: +65 67457687
E-mail: info.poultry@marel.com

Morgan Enterprise
Bedok Centre, 914614
Tel: +65 93832534
E-mail: tanchinleong2001@yahoo.com.sg

Sri Lanka

Bodum Aussenhandels GmbH
Liaison Office #11
Suranimala Place
Colombo 6
Tel: +94 11 4510719
Fax: +94 11 2827957
E-mail: bodum@sltnet.lk

Taiwan

Bartholomew Lo, Siu-Man
#50, Floor 8-1
Chung Ching 1 Street
Jen-Te Shiang - 717
Tainan Hsien
Tel: +886 9 39375876
Fax: +886 6 2709332
E-mail: bart@bigdutchman.com

Ennchih Co. Ltd.
No. 310 Chung Shan S. Rd
Taoyuan Hsien
Tel: +886 347 58168
Fax: +886 347 53803
E-mail: ennchih3@ms6.hinet.net

Ever Prima Co. Ltd.
4th Floor, No. 77
Le Shan Street
Nei Hu Chu
Taipei
Tel: +886 2 26276815
Fax: +886 2 26270211
E-mail: info.poultry@marel.com

Global Ace Trading Co.
11-F-1, No. 239
I Hsin, 1st Rd., Kaohsiung
Tel: +886 7 3335481
Fax: +886 7 3314190
E-mail: e0904@ms10.hinet.net

J. John Industry Co. Ltd.
8th Floor, No-160
Sec-6, Min Chuan E Road
Taipei
11490
Tel: +886 922 045892
E-mail: rita.hung@jjohngroup.com.tw

Thailand

American Marketing Co. Ltd.
1964, 1966, 1968,1970
On-Nut Road, Suanluang
Bangkok
10250
Tel: +66 2 3217181
Fax: +66 2 7211535
E-mail: nithitad.amcovet@gmail.com

BD Agriculture (Thailand) Ltd.
Block F7 & F8
41/76 - 77 Moo 6 Bangna Trad Rd. Km 16.5, Bangchal
Bangplee, Samutprakarn
10540
Tel: +66 2 3496531
Fax: +66 2 3496535
Web: www.bigdutchman.co.th
E-mail: bdt@bigdutchman.com

Jebsen & Jessen Ingredients
23/110-117, Sorachai Building
25th-29th Floor, Soi Sukhumvit 63 (Ekamai), Sukhumvit Road
Klongton Nua, Wattana
Bangkok, 10110
Tel: +66 2 7878700
Web: www.chemicals.jjsea.com
E-mail: info_jjcht@jjsea.com

K-Plus Engineering Co. Ltd.
299/132 Areeya Mandarina
Sutthisarn Winijchai Road
Samsennok, Huaykwang
Bangkok, 10310
Tel: +66 2 3188458
Fax: +66 2 7196092
E-mail: info.poultry@marel.com

KSP Equipment Co. Ltd.
51/845 Moo 3, Tumbon Lamsai
Amphoe Wang Noi
Pranakhonsi, Ayuttaya
13170
Tel: +662 81 76410
Fax: +662 81 76439
Web: www.lubing.com
E-mail: kannika@cpf.co.th

Vietnam

Big Dutchman Vietnam HCM Rep.
Office of BD Agriculture (Malaysia) Sdn Bhd
Unit 203
2nd Floor
91 Pasteur
St. Ben Nghe Ward, Dis.1
Tel: +84 8 39390948
Fax: +84 8 39390951
E-mail: bdvietnam@bigdutchman.com

Dong A Material-Veterinary JSC
62, Ho Tung Mau
Caudien
Tuliem
Hanoi
Tel: +84 4 37632583
Fax: +84 4 37632602
Web: www.lubing.com
E-mail: dmvjsc@fpt.vn

P & N Agro Business Co. Ltd.
798 Truong Sa Str.
Ward 14
Dist. 3
Ho Chi Minh City
Tel: +84 88 465765
Fax: +84 89 350687
E-mail: pcvan@pnagrobusiness.com

Peja Vietnam
Unit 806
Me Linh Point Tower
2 Ngo Duc Ke Street
8th Floor
1st District
Ho Chi Minh City
Tel: +84 8 8293503
Fax: +84 8 8251021
E-mail: info@pejavietnam.com

Reader Information Service

Issue 1 2015

This is a free service, readers who wish to receive urgently further information about any product or company featured in the magazine, please complete this form and fax to: **Far Eastern Agriculture** on **+44 (0) 20 7973 0076**
or e-mail to: **feag@alaincharles.com**
or post to: **Far Eastern Agriculture, University House, 11-13 Lower Grosvenor Place, London, SW1W 0EX, United Kingdom.**

Name of product and/or company	Page No.

Name: .....
Job title: .....
Company: .....
Address: .....
.....
.....
Tel: ..... Fax: .....
Your organization's product/service: .....
.....
Number of employees in your organization: .....
Signature: ..... Date: .....

Subscription form

I wish to subscribe to **Far Eastern Agriculture** for 1 year (6 issues) starting with the next copy.

Surface Rates:			
1 year:	£57	US$111	Euro €93
2 years:	£97	US$189	Euro €158
3 years:	£129	US$251	Euro €210

☐ Enclosed is my cheque/draft for .....
(Cheques made payable to Alain Charles Publishing Ltd)
☐ Please invoice
☐ Please charge to Visa/American Express/Mastercard (please circle)
Card number ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ Expiry Date ☐☐/☐☐
(please note we debit your account in sterling)
Name .....
Position .....
Organization .....
Address .....
Country .....
E-mail .....
Signed ..... Date .....

Send this form together with your remittance to:
Far Eastern Agriculture, University House, 11-13 Lower Grosvenor Place, London, SW1W 0EX, UK. Tel: +44 (0) 20 7834 7676 Fax: +44 (0) 20 7973 0076

Subscription order can also be made via the Internet: www.alaincharles.com or email at feag@alaincharles.com

Please TICK most relevant box

☐01 **Government:** municipal services, diplomatic, (UN, International Agencies)
☐03 **Educational/Research Institutes**
☐06 **Commercial Services:** banking, finance, insurance
☐08 **Import/Export Agents and Distributors**
☐09 **Farms and Plantations**
☐11 **Food Processing:** poultry, dairy, cereal, fruit, vegetables, etc
☐12 **Aid Organizations**
☐13 **Agricultural Equipment and Material Manufacturers:** irrigation, agro-chemicals
☐16 **Others:** please specify:

4. Type of produce

☐01 **Rice** ☐02 **Grain** ☐03 **Fruit** ☐04 **Cocoa** ☐05 **Coffee** ☐06 **Cotton** ☐07 **Rubber** ☐08 **Palm Oil** ☐09 **Palm Kernels** ☐10 **Sugar Cane**
☐11 **Feedstuffs** ☐12 **Groundnuts** ☐13 **Vegetables** ☐14 **Cassava** ☐15 **Dairy Cattle** ☐16 **Beef Cattle** ☐17 **Sheep/Goats** ☐18 **Pigs** ☐19 **Poultry** ☐20 **Fisheries**

unipoint® ag

SWISS QUALITY

Klinofeed®

Five in one multifunctional feed additive
The best choice for economic feed production

Improving Digestion
Supports intestinal flora

Mycotoxin Binder
Broad spectrum binding effect

Ammonia Remover
Absorbs ammonium ions in intestinal tract

Pellet quality improver
Improves the PDI

Anti-caking Agent
Improves the flow of feed

Contact and information:

unipoint® ag

unipoint ag
Gewerbestrasse 2
CH-8475 Ossingen (Switzerland)
Phone: +41 (0) 52 305 20 41
Mail: info@unipoint.ch
www.unipoint.ch

GMP+ Feed Safety Assurance
PDV 114900

Visit us at VIV ASIA on Stand H102. H083

29 - 31 July 2015
GRAND CITY CONVEX
SURABAYA
INDONESIA

INDO LIVESTOCK 2015 EXPO & FORUM

Indonesia's No.1 Livestock and Feed Industry Show

INCORPORATING WITH

SDTI
Protein Hewani untuk Sehat dan Cerdas

INDOFEED 2015 EXPO & FORUM
INDONESIA'S NO.1 FEED INDUSTRY EVENT

INDO DAIRY 2015 EXPO & FORUM
INDONESIA'S NO.1 DAIRY INDUSTRY EVENT

INDO FISHERIES 2015 EXPO & FORUM
INDONESIA'S NO.1 FISHERIES INDUSTRY EVENT

THE 10th INDONESIA'S NO.1 LIVESTOCK, FEED, DAIRY AND FISHERIES INDUSTRY SHOW

www.indolivestock.com

HOSTED BY

Directorate General of Livestock and Animal Health Services, Ministry of Agriculture, Republic of Indonesia

SUPPORTED BY

OFFICIAL LOCAL PUBLICATION

POULTRY INDONESIA

SUPPORTING PUBLICATIONS

Suradaya · TROBOS · Aqua · Infovet · medion · Far Eastern Agriculture · AQUA FEED · Milling · Milling Asia · eFeedLink · FEEDBusiness

ORGANISED BY

Showing The Way!
Napindo

PT. NAPINDO MEDIA ASHATAMA
Jl. Kelapa Sawit XIV Blok M1 No.10, Kompleks Billy & Moon, Pondok Kelapa, Jakarta 13450, Indonesia
Tel: 62-21 8650962, 8644756/85, Fax: 62-21 8650963, E-mail: info@indolivestock.com