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MAGAZINE

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Rhone Ma gives cows a 'Boosta'

Qasem Walid Alhasan and Lim Ban Keong.

Agrichexers

rises to the challenge

- The influence of feed grains in reduced crude protein broiler diets – wheat versus maize
- Holistic 3-step approach to improve gut health Step 1 of 3 - Improving drinking water and feed raw material quality
- Exploring the true value of phytase: phosphorus and beyond

MCI (P) 027/04/2020 PPS 1703/08/2012 (022871)

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FEATURE

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complete destruction of dietary phytate has been made possible through higher doses of efficient phytases, and attaining the objective of complete phytate hydrolysis adds substantially to the net commercial returns and environmental benefits associated with phytase use.

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NSP enzymes find new purpose as fiber in feed comes into focus

Fiber is present in almost all plant materials, but these are not digested by endogenous enzymes. Because of this, pig and poultry feed producers need to take fiber into account in their formulations, said Prof Knud Erik Bach Knudsen at a Kemin webinar on non-starch polysaccharide (NSP) enzymes.

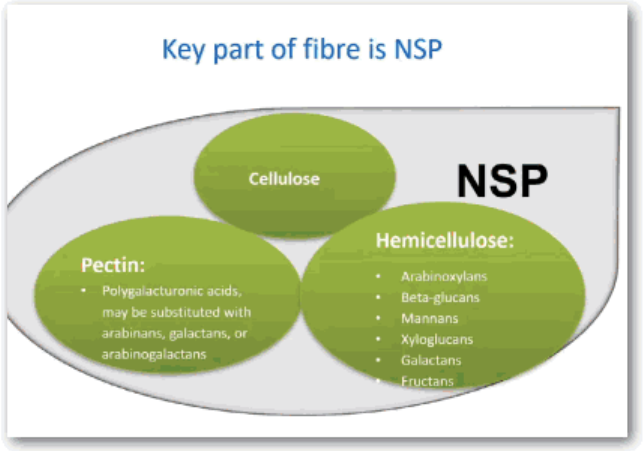
Prof Knudsen who is from the Department of Animal Science at the Aahus University in Denmark explained the need to study fiber composition in cereal and protein rich grains in order to unlock the potential of fiber.

Both types of grain have diverse non starch polysaccharides (NSP) sugar monomers and lignin

Prof Knud Knudsen

fiber content and the level to which it can be broken down. Grains which have hull layers for example are harder to breakdown as they have high lignin content and the cell walls are more complex.

Cereal co-products are also more variable in NSP content than parent grain and this can have an impact on nutritional value of the grain. For example digestibility of broken rice would be very different to



Components that make up NSP in fibre.

rich grains also have higher cellulose and pectin (which is not present in wheat and barley). This means that the digestibility of feed would also depend on the ratio of cereal to protein rich grain used.

This is important as undigested fiber can have higher lignin content which won't break down," he said.

This shows that choosing grain with fiber composition in mind will make a world of a difference towards unlocking the full potential of your feed.

and this would require multiple strategies and enzymes to breakdown the fiber in feed stuffs. In cereals for example, 80% of dry weight matter is made up of carbohydrates and lignin. But there are various proportions of

that of rice.

Chemical composition of NSPs need to be looked at

Differences in chemical composition are also seen in DDGS depending on the cereal used. NSP

"Choosing grain with fiber composition in mind will make a world of a difference towards unlocking the full potential of your feed."- Prof Knud Erik Bach Knudsen

NSPs, starch and sugars across various types of cereals. The average fiber content of cereal, according to Prof Knudsen can vary from less than 100 to more than 300g/kg dry matter. The lowest is found in sorghum and corn and highest in oats.

The tissue layers in cereals also determines the fractions in corn DDGS are more complex than wheat and the fermentation process is seen to make the arabinoxylans in corn DDGS more complex and harder to break down, said Prof Knudsen.

Arabinoxylans composition also varies between cereals and protein rich grain. Protein

a viscous effect in feed in the gut. In addition Prof Knudsen spoke of a caged effect where, some of the cell walls will stay intact while passing through the upper part of the gastrointestinal tract. "In this case even heavy processing will not be able to destroy the cell walls," he said. Undigested feed in turn has a negative effect on feed value.

Prof Knudsen promoted the use of enzymes to breakdown and modify the cell structures in grain to further increase feed value. He however noted that this can be done only for cell structures in the endosperm and aleurone cells of the particular grain. Enzyme function is very limited and almost impossible to make use of in grains which have prominent pericarp, testa and hull layers. "These are more complex and have

Oligosaccharides and gut homeostasis

Alexandra Wealleans, Innovation Project Manager of Kemin Animal Nutrition and Health started her presentation for the webinar by stating that "inside the gut lives the microbiome."

Mutualistic bacteria in the gut microbiome digest fiber into oligosaccharides and beyond. "As we rely on the microbiome to digest plant biomass, it's important that we promote the 'right' one," said Dr Wealleans.

The microbiome is always changing, due to diet, density, ventilation, and handling, among others. The changes can be very closely correlated with improved or reduced feed efficiency and growth performance.

Dr Wealleans said research have found that adding individual

leans

in turn helps maintain gut and metabolic homeostasis.

And interestingly, she added, "oligosaccharides don't work directly against

precision improves from the 30% with CF. But this still means that you are using soybean meal with NDF analysis, you are formulating with at

Alexandra Wea

oligosaccharides also changes the microbiome.

Adding specific xylo-oligosaccharides on top of a standard poultry diet had significant effects on the microbiome, including increased Clostridium cluster XIVa (butyrate producing bacteria), increased Lactobacilli and more uniform populations, and large increase (in some samples) of Anaerostipes which also produces butyric acids.

In another research, adding specific galacto-oligosaccharides in-vitro had species-specific effects on the growth of Lactobacilli, namely substantially reduced the growth of L casei and L johnsonii, minimally reduced the growth of L fermentum, and increased the growth of L crispatus.

Besides affecting individual populations, Dr Wealleans said the addition of don't work directly against pathogens in the gut, but slowly shift the microbiome over time in a beneficial direction."

When it comes to practical implementation in feed formulation, Dr Wealleans said rather than supplementing exogenous oligosaccharides, "they can be produced in situ in the gut through the application of NSPases." Moreover, added oligosaccharides or those produced in situ by enzymes can have similar beneficial effects on gut function.

"As NSPases break down large fiber fractions, they reduce the viscosity of the digesta. This is the traditional mode of action of xylanases. NSP enzymes also create oligosaccharides inside the gut itself. These oligosaccharides are now thought to be one of the main benefits of NSPase supplementation," she explained.

"The microbiome is always changing, due to diet, density, ventilation, and handling, among others. The changes can be very closely correlated with improved or reduced feed efficiency and growth performance."- Dr Alexandra Wealleans

Accounting for fiber in feed

Professor of Animal Nutrition at the University of New England in

Mingan Choct

the potential of fiber in feed formulations. He explained nutritionists need to pay attention to accurate measurement of fiber in the diet as it could make up to 30% of missing nutrient content in certain raw materials.

At present there are three ways of measuring fiber in the animal diet. One is Crude Fiber (CF) and the other two measure the chemical composition using the methods of Neutral Detergent Fiber (NDF) and Acid Detergent Fiber (ADF). CF measurements, Prof Choct pointed out were often variable and inaccurate depending on the testing lab. NDF in the meantime only measured cellulose, hemicellulose and lignin content, leaving out all the pectins and some insoluble non-starch polysaccharides (NSP). ADF analysis measured only lignin and cellulose, leaving out hemicellulose and pectins.

"When using NDF are formulating with at least 26% of ingredients unaccounted for," said Prof Choct.

The best way to measure fiber in feed thus was to use dietary fiber which represents the true fiber content of feed. This includes NSPs (cellulose, pectin and hemicellulose) and lignin. However Prof Choct pointed out that we did not have accurate databases of dietary fiber standards or for NSP levels in feed ingredients. More research on this will help nutritionists with more accurate formulations using fiber. These databases should have the true fiber content with NSP broken down to soluble, insoluble and total, he added.

Prof Choct also emphasized on the need to know what kind of NSPs we are dealing with when choosing the right NSP enzyme to break down fiber in feed. There are two kinds; soluble and insoluble (vast majority fall into this category). The higher the NSP in the diet, the lower energy it will have, using the right enzyme to break it down can increase Apparent

"Nutritionists need to pay attention to accurate measurement of fiber in the diet as it could make up to 30% of missing nutrient content in certain raw materials."- Prof Mingan Choct

oligosaccharides encourages microbiome diversity and stability. This

Australia, Mingan Choct who joined Kemin's webinar, has been studying

analysis, we can have up to 20% of the ingredients missing, though the

Metabolisable Energy (AME) in feed. According to Prof Choct's research ▷

Cargill acquires stake in Pakistan port's agri-terminal

Following an announcement last December, Cargill has acquired a 25% stake in Fauji Akbar Portia marine terminal at Port Qasim, one of Pakistan's largest bulk terminals for agricultural commodities.

The investment, for an undisclosed price, will allow Cargill to handle grains, cereals, rice, oilseeds and fertilizer at Port Qasim. The terminal itself handles close to 2.5 mt of imports annually.

A joint venture between Fauji Foundation, Akbar Group of Companies and the National Bank of Pakistan, the terminal opened in 2010 and provides complete supply chain management solutions for commodities.

Waqar Malik, Chairman Fauji Group of Companies, said: "With its global port experience, Cargill will help drive greater operational efficiencies for the port to reach its potential of handling agri-

The terminal at Port Qasim handles up to 2.5 mt of imports into Pakistan annually.

cargo safely and efficiently."

Investments

Cargill has a significant presence in Pakistan as one of the main suppliers of soybean and palm into the country. In 2019, the company announced that it was looking to invest USD 200 million in Pakistan over the next three to five years. The port terminal investment has set the ball rolling on this.

Mumtaz Kazmi, Head of Investments at Cargill Asia-Pacific, said: "This marks an important first step in our growth plans in a country of increasing importance to us."

He added that Cargill is also exploring opportunities in areas including feed milling, meat processing and oilseed crushing. "The company aims to leverage its strengths to help address the needs of the Pakistan market," added Mr Kazmi.

◁ rice had the lowest soluble NSPs and thus the highest AME, whilst Barley and Rye yielded highest soluble NSP levels, with low AME levels.

Prebiotic nature of fiber

Research has also shown that the invitro breakdown of insoluble NSPs in the gut can release oligomers that are beneficial for gut

gizzard. However the fiber additive must have physical coarseness to function, said Prof Choct. Trials conducted with fine and coarse oat hulls showed that fine oat hulls passed through the gizzard immediately whilst 30% of coarse hulls remained in the gizzard even after 48 hours. This led to better development and FCR.

Concluding his talk, Prof

health. Insoluble NSPs, when broken down in the guy, can act as substrates for bioactive components. Thus acting as a gut enhancer or prebiotic, "At appropriate levels, it is beneficial. Benefits depend on the structural nature of the fiber in which they are embedded," said Prof Choct.

"This means that in future the focus of enzyme use may be shifted to producing prebiotics in situ instead of adding them separately to feed as supplements," he added.

Finally when speaking of fiber, fiber additives, are essential structural component for development in birds-especially that of the

Choct noted that despite the advantages of knowing your NSP levels, NSP analysis was still expensive and it would take time to build a good database with a lot of samples.

More research would also need to be done to understand which oligosaccharides, produced in vitro would have beneficial effects for the animal. Research in this area is in its preliminary stages.

"But this research is important. If you take a popular ingredient such as soybean meal, 48% is protein but the remaining 52% has a large amount of NSP present. We have to see how we can make use of that," he said. AF

Bangladesh to open new QC Lab

Dr Nathu Ram Sarker

Bangladesh's Department of Livestock Services has spent USD 12.4 million on a new laboratory to test the quality of eggs, meat and animal feed.

Bangladesh Livestock Research Institute Director General Nathu Ram Sarker told *Asian Feed Magazine* that complaints about food safety had prompted construction of the facility in Dhaka.

Incidences of feed samples containing heavy metal contaminants have often been highlighted in the media.

"We have seen many reports and at times rumors that broiler chicken or fish are not safe for human consumption. So we figured we should conduct tests on these to verify such reports," he said.

The laboratory will also monitor feedmills' use of AGPs, which is prohibited in Bangladesh, and certify products that are suitable for export.

Dr Sarkar said staff will conduct random testing and sampling from meat markets and feed retailers to check for contaminants, with the results published online.

Philippine feed industry bracing for another year in the doldrums

African swine fever and the Covid-19 pandemic will continue to dampen feed demand and subdue the Philippine feed industry in 2021.

A feed executive told *Asian Feed Magazine* that the "significant decrease in swine population and fall in [animal protein] demand with the tourism and service industry still

remaining high and imports continuing to arrive—a combination that hurt the industry last year—producers fear their problems will continue into this year.

However, some observers see the possibility of a rebound, noting that the foodservice sector is slowly picking up as the economy starts

Philippine feed industry will continue to feel the effects of ASF and the pandemic in 2021.

Meanwhile, corn

US were the Philippines'

and service industry still down" meant lower feed requirements.

He urged the government to push for stringent rules to prevent ASF transmission and ensure it did not spread into the Visayas.

To date, the government has culled over 400,000 pigs due to ASF, though the fall in inventory is much higher because of preventive downsizing and voluntary farm closures to stem further losses.

"There is a lot of interest in continuing hog production, but fear about the recurrence of ASF lingers," the stakeholder said.

Volatile broiler industry

Meanwhile, the broiler industry is expected to remain volatile this year, with companies reticent to make long-term production plans.

These plans depend on how prices move, with prices in turn relying on market demand. With cold storage inventory up as the economy starts moving again. This would help offset lost feed demand from the pig industry.

For now, the layer segment continues to be the industry's star performer, since egg demand still remains high.

Raw material delay

There are some concerns, however, about new regulations from the Department of Agriculture on the issuance of sanitary and phytosanitary import clearances. Industry figures say the new requirements will inhibit trade and add further difficulties for the hog and broiler sectors.

Industry figures say the new requirements will inhibit trade and add further difficulties for the hog and broiler sectors.

"[These new regulations] may delay the flow of commodities for feed production," the stakeholder said.

In its latest *Grain and Feed Update* on the Philippines, the USDA noted that in 2021, the new regulations and the country's ongoing ASF battle could lead to a '200,000 mt decline in wheat imports, with weaker demand for feed wheat offsetting growth in milling wheat'.

imports are forecast to reach 600,000 tons next year. The USDA noted that in July-September 2020 alone, the country imported 375,000 tons. That near equals total imports for marketing year 2019-20. Vietnam and the leading corn supplier in the third quarter.

However, the agency said the new regulations "could disrupt corn [and feed wheat] imports and limit feed availability/ affordability in 2021".

Vietnam faces material shortage

Vietnam's hunger for feed materials is expected to continue throughout the first quarter of this year, leading livestock producers to prepare for a tide of price rises.

Since October, more expensive raw materials have prompted major feed producers including Masan Meatlife, GreenFeed and Mavin to increase prices to between USD 8.6-21.6/ton.

Blaming the strength of the global market, some feed producers say they are being forced to compete with companies overseas in purchasing materials before they become unaffordable.

According to Vietnamese customs data, corn imports have been falling since last October, when the country received 1.5 mt. In November, the volume dropped to 1.1 mt, followed by a further decrease in December, with just 404,557 tons entering the country in the first half of the month.

Quoting local corn traders, Agricensus said Vietnam had enough corn stocks to get through January, but supplies would become tighter from February onwards.

As supplies tighten from traditional sources such as Argentina and Brazil, some major feed producers have been looking for alternatives.

"We are thinking of sourcing from local suppliers," Nguyen Anh Tuan, Deputy Director of Mavin Group, told *Asian Feed Magazine*.

One of the largest feed producers in Vietnam, Mavin has been buying feed corn from local sellers at around USD 255/ton, up to USD 10 cheaper than imported corn.

Some smaller feed producers are also looking to import from lesser known destinations such as India or Myanmar, despite quality concerns.

FEATURE

Warehouse automation: A missed opportunity

Farmsco Feed Indonesia's 5000-ton capacity product warehouse.


Ekhlasul Haque

Ekhasul Haque, Managing Director of Bangladesh agro-industrial solutions provider Chicks and Feeds, first noticed the need for warehouse automation when the pandemic caused a severe labor shortage in the

first floor. The feedmill tower is placed at the end of the warehouse, instead of the more conventional middle, to employ the largest storage area.

He explained that with this model, trucks delivering raw materials would unload their goods onto conveyor belts on the ground floor. These belts would then move the ingredients to specific stacking areas, where a series of "service belts" attached to the

Digital technologies are transforming warehouse management and ZAHRAH IMTIAZ looks at how these changes are boosting efficiency, reducing costs and responding to changes in the way feed is made.

feedmill industry.

"Since many feedmills had stopped production due to the crisis, we decided to devise ways in which even warehouses could be automated," he told *Asian Feed Magazine*.

Up to that point, the company's focus had mainly been on automating operations in the feedmill, while leaving workers to load, unload and move raw materials manually.

New design

However, under a new system designed by Mr Haque, feedmills are built over two storeys, with the warehouse on the ground floor and the finished products occupying the main conveyor belt would separate ingredients.

Fewer operators

"Under the new system, we expect unloading and loading to take just 15 minutes with belts moving at 6-7 meters every minute," he said. Instead of the hundreds of workers who would usually handle these operations, the new design will only require eight for ground-floor operations.

The first floor, which stocks finished goods, would be known as a 'clean zone', since it is devoid of raw materials, dust and dirty items in Mr Haque's model. Bagging stations ▷

and

manufacture

From the team at

ASIAN FEED

◁ will be installed there, with all bags transported on another conveyer to the storage area.

All cross conveyors would have

All cross conveyors would have pneumatic gates at the end that are opened by a sensor that recognizes when a bag has arrived. The bags then continue on the conveyor to trucks below. No labor is needed to run the process.

"We only need a few workers next to cross-conveyors to arrange the bags for storage, or near the trucks to arrange them," said Mr Haque.

Finally, all bags will carry barcodes for both raw materials and finished products. This will ensure that the bags go onto the right conveyor belts on either floor.

Mr Haque said that this model would be ideal for feedmills that have limited space, since capacity would be doubled at a two storey facility without the need for more floor space.

"If built according to our design, we expect an ROI within one to two years," he added.

Chicks and Feeds is working on this new system at Paragon Bangladesh's new feedmill this year.

Automated packing

Sujai

Similarly, Farmsco Feed Indonesia, a subsidiary of South Korea's Harim Group, has seen success with a novel automation set-up at its feedmill warehouse.

Production Manager Sujai said the company operates a receiving system and verifies ingredient unloading and bulk storage destinations. This system transfers incoming materials into storage bins, ingredient bins and the warehouse.

Robotic arms are used in Chinese feedmill warehouses.

An automated system is also used for packaging and organizing the warehouse. Nevertheless, the finished product loaded onto trucks is still done manually.

"At this stage, we have not automated, like other companies that use conveyors," he told *Asian Feed Magazine.*

However, it is looking to fully automate the process. Mr Sujai said he has found a Chinese vendor that sells the equipment he needs.

Farmsco has seven warehouses, including three for products, with a capacity of 5,000 tons; two for packaged raw materials, with a capacity of 4,000 tons; and two for bulk raw materials, with a capacity of 15,000 tons.

Elevator system

Sido Agung Feed in Central Java has brought in automation at its warehouse for raw materials.

Its Director, Asrokh Nawawi, said this is divided between corn and bulk raw materials such as soybean meal, DDGS, meat and bone meal and corn gluten meal. Mr Nawawi explained that the system accepts raw materials from suppliers that are stored in stacking areas.

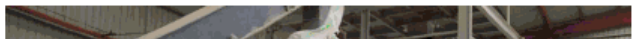
Asrokh Nawawi

After it is received from suppliers with a moisture content of 18-20%, corn is moved into the intake area through the bulk system via a control panel. It is then pulled through a screw conveyor and elevator before being transferred to one of three wet silos, each with a capacity of 300 tons.

From the wet silos, an operator transfers the corn to the dryer through a transport system and elevator. Once the moisture content falls to 14-15%, the corn is moved to one of six dry silos, each with a capacity of 3,000 tons.

A scale is attached to the transport system just before the silo, so that tonnage can be controlled.

Mr Nawawi told *Asian Feed Magazine* that two areas for bulk raw materials, namely the intake and raw material areas, consist of 22 plots. In



Above: Chicks and Feeds has designed a fully automated warehouse.

Right: Traditional warehouses have to deal with higher costs, lower output and labor issues.

this raw materials area, there is also an intake area that transfers materials to the production engine.

A control panel operates the movement of raw materials into the intake area through a screw conveyor. To prevent dust, a filter has been installed there. The elevator also moves through the transport system to organize the raw materials into their specified warehouse plots.

At the bulk warehouse, raw materials move into the second intake area, where they are transferred to the production bin.

Indonesian poultry integrator Malindo Feedmill is also working on a transfer system between bulk raw materials and storage bins, ingredient bins and warehouse.

"This is still under development and being trialed. We have not been able to deliver the progress that we expected," Malindo's Director, Rewin Hanrahan, told *Asian Feed Magazine*.

However, Mr Hanrahan explained, it will be a good way to reduce costs and boost efficiency.

A new frontier

While we see warehouse automation making some progress in Bangladesh and Indonesia, in Thailand, one of the biggest feed markets in the world, this is still an emerging field for feedmillers to explore.

Rewin Hanrahan

Yodchai Kasemsuksathaporn, a feedmill consultant, said no feedmill in the country uses fully automated systems in their warehouses. However, some feedmills do use partial automation.

He said workers handle feed bagging and transfer to pallets. Now automatic packing machines can handle bagging and count the number of bags, after which robotic arms place these on pallets. Still, employees use forklifts to handle the later process in the warehouse.

Mr Yodchai said fewer than 10 Thai feedmills use automatic packing machines and robotic arms. One reason for this is the steep cost involved. He explained that automated equipment like this that can handle 800 bags of feed per hour could cost around USD 600,000.

Yodchai Kasemsuksathaporn

"The new equipment, which is sophisticated and expensive, will perform better than manual labor. But labor is still cheaper," he said, adding: "feed margins are not high enough for investment in new machinery."

However, these machines, with their stable performance, should perform consistently, and consequently, increase productivity in the feedmill. By contrast, manual work can be exhausting in a feedmill; moreover, workers are difficult to find and feedmills tend to experience high staff turnover, he added.

In the next 5-10 years, Mr Yodchai expects more Thai feedmills to bring in automated systems to increase productivity and deal with mounting labor issues. AF

Sri Lankan poultry farmers in panic over fall armyworm

A significant area of corn in Sri Lanka has come under attack from fall armyworm, prompting predictions of harvest devastation this year.

even higher later on," Mr Gunasekara added.

Not enough corn

Many medium-scale feedmills have been forced

Farmers associations and the government expect between 25% and 80% of production to be destroyed by the infestation.

The government has allocated USD 31,899 to the worst affected districts, including Ampara, Anuradhapura, Polonnaruwa, Kurunegala and Moneragala, to tackle the worm by sprinkling ash and a new germicide on crops.

This is the latest blow for the poultry industry, which is already reeling from a ban on corn imports.

The All Island Poultry Association has been working with corn farmers to encourage them to grow more corn for the poultry industry. "We assured them a guaranteed price and buy back as we desperately need more corn," its President, Ajith Gunasekara, told *Asian Feed Magazine*.

By late December the infestation had spread across the country, leading corn prices to rise to as much as USD 0.56/kg—almost double the government-mandated control price of USD 0.29.

"This is encouraging the middlemen and traders to hoard more corn. to close due to a shortage of corn and high prices. As a result, poultry farmers will have to bear higher losses, said Mr Gunasekara.

"We will need to increase the price of chicken, but consumers do not have the purchasing power to keep up. So we need to think of that," he added.

The new harvest is expected to come in between February and March, though the poultry association expects it to fall short of predictions.

Many medium-scale feedmills have been forced to close due to a shortage of corn and high prices.

Sri Lankan President Gotabaya Rajapaksa visited areas affected by fall armyworm.

Though the Ministry of Agriculture is targeting production from 112,534 hectares during the current growing season, Department of Agriculture statistics show that only 17% of that target had been met by last November.

Poultry farmers have asked the government to re-evaluate field data and allow imports to cover any shortfall.

"The government is worried that if imports are allowed, it would affect local farmers. But when we imported wheat to replace corn even as late as December 15, it had no impact on the local corn market. Prices simply continued to rise," said Mr Gunasekara.

CP opens produce sales points for farmers

In a bid to reduce its environmental footprint, CP Foods has opened 17 points where farmers can sell their produce above market price.

These comprise 15 feedmills and two new corn-purchasing stations in Uthai Thani and Nakhon Ratchasima provinces.

Woraphot Suratwisit, Vice-President of Bangkok Produce Merchandising, a CP subsidiary, said the "self-sufficient farmers, sustainable corn" project would help smallholders by offering transport, harvest arrangements and financial support to reduce production costs.

The Thai agri-food giant asserts that it only buys corn from responsible and traceable sources that have legal land deeds and are not involved in forest encroachment.

Elsewhere, CP has been granted Good Manufacturing Practices Plus certification for its feedmills from Control Union Thailand.

"The feed business plays an important role in the value chain, where feed safety and traceability are important factors," said Rewat Hathaisattayapong, Executive Vice-President of CP's livestock feed business.

The certification defines conditions relating to production facilities, as well as for storage, transport, trade

Some are even investing in buying up corn at high prices so they can sell it

CPF has been granted GMP+ certification.

and monitoring activities, to ensure high safety and quality standards are met throughout the feed chain.

Thailand's corn production to grow by a quarter

Thailand expects to produce 5.6 mt of corn by the end of the current harvest, representing an increase of 24% over 2019-20 production.

According to the latest USDA report, acreage expansion and favorable weather have contributed to the rise, leading to the average corn price declining by 2% on the year between last January and October to USD 246/ton.

Duty-free imports from neighboring countries under the Asean free-trade agreement, particularly from Myanmar, have also influenced corn prices.

Nevertheless, Thai corn prices are still well above the immediate five-year average, helped by the government putting steep tariffs on imported alternative feed grains such as feed wheat and limiting

Thai Union Feedmill plans for IPO

Thiraphong Chansiri

Thai Union Feedmill is planning to list on Bangkok's stock exchange in mid-2021, according to Thiraphong Chansiri, President and Chief Executive of its parent, Thai Union Group. The company, which distributes feed for shrimp and freshwater fish domestically and overseas, had initially planned the IPO for last year, though the pandemic caused a delay.

Meanwhile, Thai Union Group has announced plans to invest almost USD 200 million this year, marking its highest capex budget in three years, Mr Thiraphong said.

The company plans to spend USD 138.6 million on improving efficiency in its core seafood and tuna businesses by investing in automation, robotics and new computer systems.

Taking a positive view of 2021, Mr Thiraphong said Thai Union will spend the year focusing on profitability, rather than on revenue growth. The company expects to maintain single-digit revenue growth with anticipated gross profits of 16-17%, he added.

Evonik launches mobile NIR device

Evonik has launched a mobile near-infrared spectroscopy device that can determine the energy and nutrient content of raw materials and feed, independent of a laboratory.

The hand-held Aminonir Portable device connects with tablets and smartphones and only requires a mobile signal to determine the quality of materials without the need for sample preparation.

It can be used to analyze more than 40 different raw materials and feed mixtures for broilers, laying hens, pigs and fish.

"We now offer a comprehensive mobile solution that will allow for timely quality checks and decision-making at critical steps in feed production, which is difficult to achieve when relying only on a traditional lab set-up," said Stefan Mack, Head of Service Marketing.

Malindo launches feed for native chickens

Demand in Indonesia for native chicken has been growing as more restaurants offer the meat on their menus. This in turn has

import quantities.

The government has assured farmers that there will be price guarantees for the upcoming harvest and other measures to keep the domestic corn market stable.

Meanwhile, Thailand's feed wheat imports totaled 0.7 mt in the first four months of the current production year, down 6% on the year, due to increased domestic production and imports, as well as a slowdown in poultry and livestock feed demand last year.

This year should also see lower imports of wheat to the tune of 14% year on year, due to subdued demand for feed and milling wheat.

Rewin Hanrahan

more restaurants offer the meat on their menus. This in turn has prompted farmers to raise their production of native chickens.

However, according to Rewin Hanrahan, Director of feed producer Malindo Feedmill, most farmers do not give their birds high-quality feed.

He told *Asian Feed Magazine* that Malindo has launched a new feed formulated for native chickens. "We want to encourage more farmers to use high quality, nutritious and cost-efficient feed for their native chickens," he said.

The new feed is produced at the company's feedmill in East Java, one of Indonesia's main native chicken production centers.

"The market response has been good and we may start producing the feed at our other feedmills," said Mr Hanrahan.

Unido award

Elsewhere, Malindo has received an award from the United Nations Industrial Development Organization (Unido) for its contribution to the organization's Resource Efficient and Cleaner Production Program.

"We want to encourage more farmers to use high quality, nutritious and cost-efficient feed for their native chickens," he said.

The award recognizes its feedmill in Banten province, which replaced coal used in its boilers with palm kernel shells in 2017.

Senior Plant Manager Ferry Surianto said Malindo is committed to saving more energy from feed milling operations for greater efficiency and sustainability.

India leads Agrinusa's pan-Asian feed premix ambitions

Teguh Prajitno

Agrinusa Jaya Santosa has its sights set on India's poultry and dairy cattle industries as it expands its vitamin and mineral premix supplies into new Asian markets.

The subsidiary of Japfa Comfeed poultry vaccine market by promoting our product quality. We will take the same approach with premix," Dr Prajitno told *Asian Feed Magazine*.

"We are confident it will be successful because Japfa's nutrition team is in charge of raw material procurement, formulation and quality control. Testing in Singapore showed that our premix is top quality."

Capacity expansion

To meet demand for exports, in

Indonesia began exporting to India last October with a 27-ton shipment worth USD 213,000. By the end of this year, it expects to have delivered 100 tons to India, along with Vietnam, Bangladesh and Myanmar, worth around USD 1 million.

Teguh Prajitno, Managing Director of Japfa's Animal Health and Livestock Equipment business unit, said India's broiler PS population stands at around 30 million birds, making it a big market for premix demand.

"For dairy cattle, the Indian market will be even bigger due to high milk consumption there. So these are both interesting markets for us," he said.

Agrinusa's Indian operation, Vaksindo Animal Health, will distribute the premix, in particular to poultry breeders that have been using its vaccines.

"We grabbed a chunk of the Indian addition to domestic sales, Agrinusa will need to expand its premix production capacity.

To this end, it is completing a second tower at its plant in Lippo Cikarang, West Java, where commercial production is expected to begin next month.

The new tower will have a capacity of 2 tons/hour of vitamin premix per hour, using a horizontal mixer from France.

This represents double the output of its current tower, which was upgraded in 2019 and produces mineral premix.

Agrinusa's decision to separate vitamin and mineral premix production was to ensure product quality.

"Residue from mineral premix production is easily oxidized. If we use the same tower, the residue could cause the vitamins to oxidize, which would damage them," said Dr Prajitno.

Agrinusa began vitamin premix exports to India last year.

Thai Union adopts algae ingredient for shrimp

Seafood major Thai Union will use Corbion's AlgaPrime DHA as a shrimp feed ingredient, following successful trials at farms last year.

The algae ingredient is produced from fermented cane sugar and contains more omega-3 than common fish oils. The trial validated the ingredient's use at scale.

Thai Union was also enticed by AlgaPrime DHA's sustainability credentials, having made it a corporate priority to use ingredients that are traceable and sustainably produced.

Indonesia exports hybrid corn seeds to Thailand

Indonesia has exported its first consignment of hybrid corn seeds to Thailand, with 14 tons of JH 37 and RK 457 seeds arriving there in December.

The seeds were created by the Research and Development Agency of the Ministry of Agriculture and developed by farmers in East Java.

Fathul Huda, Tuban Regent inaugurated the first consignment of hybrid corn seed to Thailand.

"The export proves that our domestic seeds are capable of competing with foreign suppliers," said Director General of Food Plants, Suwandi.

"We hope the export can contribute to Indonesia's economic development as well as the welfare of farmers," he added.

He now hopes to expand exports of the seeds to Timor Leste, Brunei, Philippines and Bangladesh, and to markets in Africa.

Indonesia had previously been a net importer of hybrid corn seeds from Thailand until the first shipment, worth USD 56,000, broke the trend.

Trouw India opens first greenfield project in Telangana

Amid plans for growth in South Asia, Trouw Nutrition India opened its first animal nutrition facility in Telangana in December.

With an annual capacity of 20,000 tons, the plant will be one of the biggest manufacturers of vitamins, mineral premixes, mineral blends and feed safety solutions in South Asia.

"Its unique 45m high tower facilitates vertical flow from raw materials to finished product, encompassing the complete production cycle from weighing the raw materials to packaging the finished product," said the company.

Trouw, a division of Dutch company Nutreco, has been scaling up production in South Asia over the last three years. The new USD 24 million facility in Hyderabad will initially cater for the Indian market before supplying markets including Bangladesh, Nepal and Sri Lanka.

The plant is expected to reach full capacity in 2025. Another Nutreco facility is under construction in Gujarat and is expected to open this year.

"As an innovation-driven organization, we bring enormous operational efficiencies with a lower turnaround time and better customization to meet customer needs.

"Telangana is centrally located and one of the most investor-friendly states. It is also a major belt for poultry and aqua with logistical access to good ports," said Saurabh Shekhar, General Manager of Nutreco in South Asia.

Dr Shekhar opened Trouw's new green facility in December.

Jurrien Zandbergen, Managing Director of Nutreco Asia, added: "We are actively looking for partnerships, customer relationships and technology partnerships in the South Asian and Indian markets."

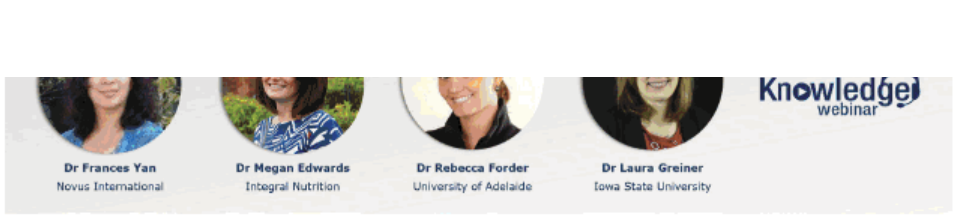
Novus's webinars have facilitated knowledge sharing

Novus International Southeast Asia and Pacific organized over ten webinars since last April to address challenges facing the industry, such as gut health, sow feeding, and maximizing performance with low crude protein diets.

In August, Charles Stark of Kansas State

University hosted a two-part webinar on feed milling, covering among others, troubleshooting measures for problems during grinding, mixing and pelleting feed.
In addition, Dr Stark discussed biosecurity and process control measures to minimize ASF and Covid-19.

A session by Dr Laura Greiner of Iowa State University on feeding sows stressed the importance of building a good understanding of the herd, genetics and management to maximize animal performance.



Novus has organized over 10 webinars since April.

According to Annafe Perino, Product Manager at Novus International Southeast Asia and Pacific: "Learning should never stop, despite the circumstances around us. Through these webinars, we are still able to touch base with our customers and share insights on the latest practices and research on both swine and poultry species."

In the most recent session, in November, the Novus Knowledge Webinar featured Douglas Korver from the University of Alberta for a breeder masterclass covering topics about breeder structural integrity, including Ca and P nutrition and skeletal development, organic trace minerals in breeder diets, broiler production and shell quality.

FEATURE

A semi-open barn enables the cows to stay cool in the tropics.

Rhone Ma gives cows a 'Boosta'

Qasem Walid Alhasan and Lim Ban Keong.

RAJESWARI RAMANEE looks at how Malaysia's Rhone Ma is using specialized feed to produce A2 milk.

Malaysian animal nutrition major Rhone Ma Holdings has been working hard to formulate feed for cows producing A2 milk, since it acquired non-controlling interests in three livestock companies in 2020. The deals worth USD 1.9 million will expand its business into dairy farming and sell A2 milk in the domestic market.

Lim Ban Keong, Rhone Ma's Managing Director, was in discussions with Rosli Mai Lam, his friend and Founder of One Lazuli, one of his company's acquisitions in 2019, about how to get into the ruminant sector.

"He told me about One Lazuli's dairy feed and nutrition venture with his partner, Qasem Walid Alhasan, who was rearing dairy cows at Nor Livestock Farm," Dr Lim told *Asian Feed Magazine*.

"They invited me to visit their facilities and together we decided to consolidate our customers, products and technical services, hoping that we could become a total solutions provider to boost revenue."

One Lazuli provides equipment, vaccines and premix solutions for the ruminant industry, while Nor Livestock breeds A2 dairy cows at its 6-acre farm in Selangor.


A mechanical waste sweeper maintains barn hygiene.

MILK BOOSTA

Minerals: Calcium, phosphorus

Milking equipment imported from Italy.

"The mission from the start was to differentiate ourselves in the market by providing fresh A2 milk. We see a big future with more consumers choosing food for health and wellness, and A2 milk offers assurance that there will be no adverse lactose response on their gut," he said.

By end of 2020, the farm had increased its milk production to 60-70,000 liters, especially since its Australian Holstein A2 cows produce more milk than regular crossbreeds.

Right feed formulation for A2 milk

Nevertheless, dairy cows have traditionally struggled in Malaysia's climate. Nor Lazuli has managed to get around this by using an energy-inducing feed formulation to de-stress the animals.

"Dairy cows living under cooler climates are usually given protein-infused feed as they don't need as much energy to move. But for humid climates, they need to move around and wag their tails to fan themselves," said Mr Qasem.

To this end, the farm flies in bales of alfalfa from America, which it uses with locally grown napier grass. It also formulated a supplement, named Milk Boosta, to increase the animals' energy.

This contains soybean meal, corn, rice bran, palm kernel meal, bypass fat and yeast. It is fortified with amino acids, vitamins A, E, and D3 and corn gluten meal. Mr Qasem added that the premium cattle feed helps to increase milk production, improve their fertility and protect their hooves.

In their housing, the cattle are given 8-centimeter thick bedding and rubbery stalls to avoid injury. A fully stainless-steel milking structure has also been installed with a fully automated milking line that allows up to 500 heads to be milked at one time. Additionally, imported fans with misting systems are also installed to keep the herd cool. AF

zinc, selenium, sodium, manganese, biotin, magnesium, sulphur, iron, cobalt, potassium, copper, iodine.

Milk Boosta is formulated for dairy cows in tropical climates.

Alfalfa offers cattle more energy than local feed.

A2 milk explanation

A2 is a variety of milk that mostly lacks the A1 form of beta-casein protein that can be difficult for some people to digest. However, few other Malaysian dairies raise cows that produce the milk.

Nor Livestock Farm has 200 heads of A2A2 cows and was expected to introduce a further 90 or more female cows born by the end of 2020.

Mr Alhasan said the Holstein A2A2 cows beginning batch started at 40 heads, which came to Malaysia pregnant with female calves. Later,

Home for the first batch of calves.

another purebred pregnant batch was added, bringing the total to about 200 heads.

"A2 cows are the naturally occurring gene in dairy. We hired a dairy partner in Australia to hunt for A2 cows in Victoria and select the best genes out of them. The females were later impregnated and airflown to our farm in Batang Kali.

"There are 28 female calves born from the first batch and it will take them 1.8 months to be impregnated again, which will be done on the farm. We expect around 90+ female cows to be born again end of 2020," he explained.

Exploiting local abundance to counter Chinese market might

The world relies too much on China to supply raw materials for animal health products, leading to an "unhealthy" imbalance.

That is according to Suaedi Sunanto, President-Director of natural health products manufacturer Nutricell Pacific, who said this disparity became apparent at the onset of the coronavirus pandemic.

At the end of 2019, when China was in the grip of the virus, supplies of raw materials were short. Chinese suppliers are able

Suaedi Sunanto

livestock and feed markets that have been moving towards natural solutions and reducing their use of antibiotics. Since Indonesia is rich in a wide range of natural resources, the extracted from the shell of cashew nuts, which is processed into animal health products by its buyers. The extract contains anarcadic acids that have antibacterial properties and are potentially effective for the control of protozoa and Eimeria.

Cashew nut is abundant in Indonesia and their shells are discarded by manufacturers. Having the materials widely available allows the company to compete in the face of China's dominance.

"Continuous supply of raw material is key if we want to sustain export," he added.

Recently, it exported five tons of the extract for the first time to Europe. Mr Sunanto believes this delivery proved the company is able to meet international standards for plant extract production.

"Nutricell uses a technique called molecular docking that allows it to screen and select molecules in a plant extract that has the potential to overcome animal health problems"

De Heus promotes responsible feeding

to produce raw materials at lower cost than their competitors.

"The scales tip too far towards China. To counter this, we need to use more local raw materials that restore the equilibrium. This is what we are doing at Nutricell," Mr Sunanto told *Asian Feed Magazine*.

Indonesia's Nutricell has started targeting global market provides a "great opportunity that Nutricell must take advantage of," he added.

The company uses a technique called molecular docking that allows it to screen and select molecules in a plant extract that has the potential to overcome animal health problems.

It manufactures oil

Nutricell recently made its first shipment to a buyer in Europe.

De Heus operates in Vietnam, Myanmar, Indonesia and India.

De Heus Animal Nutrition will build an Asia-wide sustainable value chain while supporting farmers in producing safe and healthy meat, as part of a long-term program.

Corporate Affairs Manager Michiel Peters said the company had developed a means for farmers to improve phosphate efficiency while improving feed conversion. In addition, it has been helping them optimize their use of minerals and avoid farmland overfertilization.

Local research farms also allow De Heus to determine exactly how feed types and conditions will lead to healthier animals and better feed efficiency in Asia.

"By doing so, we are contributing to the accessibility of safe and nutritional rich food that is produced responsibly," Mr Peters said in a webinar.

Moreover, De Heus has built a rooftop solar energy system for its Mandalay feedmill to produce 663 MWh of renewable energy annually, or the equivalent 1.5 mt of CO2 savings.

Pay attention to early feeding in broiler chicks

Mr Suyono said digestion begins once a chick has its first meal, generating heat and warming the

Amin Suyono

Early feeding in broilers is important for stimulating birds' intestinal development soon after birth. This helps reduce the stress chicks experience and supports better organ development, leading to better gut health later in life, say experts.

Amin Suyono, Regional Technical Manager of Cobb Vantress Asia, told *Asian Feed Magazine* that feed and water should be available to chicks at the time of placement.

Prior to their arrival, feed should be prepared on the main feeder line and on additional paper or feeder flats placed on either side of the drinker lines. Water lines should be adjusted to the proper height with a flow rate of 40 ml/minute. Supplemental drinkers can be used to increase the watering space.

The goal is to ensure that, soon after placement, chicks can start eating immediately

chick. Chicks that are slow to feed risk being too cold, and they rely more on supplemental heat. "A slow start is often associated with more chicks being culled, delayed thermo-regulation competence, poor uniformity and failure to achieve final market weight," he said.

Various factors need to be considered for successful early feeding, including feeder space, brooding temperature, water, lighting and ventilation.

Successful feeding

To add feeder space, cover 50% of the brooding area with high-quality paper capable of lasting five days. Place the paper on either side of each drinker line so the chicks will easily find water after feeding. Place 75g of feed for every chick on the paper and fill the main feeder pre-placement. During placement, put the chicks on top of the feed so they can start

Feeding the chicks and ensuring water availability after arrival on the farm is still the most common practice.

The goal is to ensure that, soon after placement, chicks can start eating immediately and have water available and in easy reach when they need it.

search or recognize the feed or feeder.

In terms of brooding temperature, chicks should be in their comfort zone to maximize feed intake. Pre-heat the brooding chamber 48 hours prior to chick arrival to maintain a stable temperature.

Clean water should be available to chicks otherwise they will stop eating. In the first 24 hours, each bird should take in 1 ml of water/hour, or 24 ml/bird/day. In general, water consumption should be equal to 50% of a chick's body weight.

First week of feeding

A study from Maiorka et al., 2003 showed that the villi from chicks that consumed feed and water 24 hours after hatching grew bigger and for longer compared with villi from chicks without feed.

Additional studies show that water and feed restrictions in the first three days of a chick's

Early feeding hesitancy

Although the benefits of early feeding are clear, Mr Suyono said some farmers are reluctant to provide feed on paper. They worry that this would lead to contamination because of chick droppings and air humidity. This should not be a concern, as heating the brooding chamber reduces humidity and keeps the feed dry. "We recommend feed on paper only for 3-4 days, post-placement."

He added that to evaluate early feeding, 100 chicks should be crop-checked the morning after placement, aiming for at least 95% chicks being crop filled with feed and water. Normally, chicks will consume feed equal to 25% of bodyweight in the first 24 hours after placement. "If chicks are slow to eat and drink, identify the issue and correct it immediately," said Mr Suyono.

and have water available and in easy reach when they need it.

eating immediately. It is important that no time is wasted for chicks to

life negatively affect the small intestine length and gizzard size.

Read more on early feeding at www.asian-agribiz.com

Superindo satisfied with move into pet food

Sutopo

Indonesia's Superindo Jaya Makmur is expecting 25% growth in demand for its pet food this year.

The company joined the local petfood market in 2019, and since then it has been satisfied with its performance.

"Demand for our pet food continues to increase. Busy lifestyles and awareness of pet nutrition have prompted pet owners to switch to commercial feed," Sutopo, Superindo's Director, told *Asian Feed Magazine*.

The company markets its Winky brand to the budget market and it distributes the Vitakraf brand from Germany for the premium segment.

"We focus in Java because the market is lucrative here but we are also looking for other potential markets," Mr Sutopo added.

GreenFeed Vietnam starts pig feed supply in Laos

GreenFeed Vietnam has distributed the first eight tons of its locally produced GF08 feed for lactating sows in Laos.

The feed was produced at the company's first feedmill in the country. Previously, GreenFeed would export its products from across the border in Vietnam.

The new feedmill, which occupies 2.7 hectares in Vientiane, cost USD 8 million and has an annual capacity of 150,000 tons.

"It not only supplies our feed products faster to Lao farmers, it also helps us better understand the market and bring safer and more productive livestock solutions to the country," GreenFeed said in a statement.

The Lao feedmill is one of nine operated by GreenFeed in Southeast Asia. Together, they have an annual capacity of over 2 mt, and each one uses equipment from the US and Europe.

GreenFeed is breaking into Laos.

Lull in Pakistan's poultry sector hits soybean imports

The latest USDA GAIN report showed a 15% drop in demand for soybean

Superindo's pet food under the Winky brand.

imports to Pakistan in 2019-20.

It attributed the fall, to a 1.7 mt drop in feed demand from the poultry industry, caused by the pandemic, and "ongoing uncertainty regarding Pakistan's gap in regulations for GE products intended for food, feed and processing".

Imports are expected to pick up in 2020-21 as demand for poultry and dairy products bounces back. In addition, recent efforts to modernize Pakistan's poultry and dairy sectors should generate renewed demand for high-protein feed ingredients such as soybean meal.

Restrictions on social, religious and political gatherings last year put pressure on poultry and meat consumption, reducing overall demand for soybean meal.

Imports are expected to pick up in 2020-21 as demand for poultry and dairy products bounces back.

"Reacting to lower consumer demand, the poultry industry reduced supplies, subsequently spurring a doubling of chicken prices in one year when consumer demand rose and prompting further investment in the sector," said the USDA report.

The latest data collected from the All Pakistan Solvent Extractor Association showed that during last October and November, Pakistan imported over 280,000 tons of soybean and its members booked around 1.8 mt of orders through to this August. Amid this pace of growth, USDA is projecting imports reaching 2.4 mt this production year.

DSM feed ingredient shown to reduce methane by 80%

A novel feed ingredient by Royal DSM can lower methane emissions by up to 80% in beef cattle without negative effects on animal health or performance.

A two-year trial in Canada, with over 15,000 cattle tested, demonstrated the success of the ingredient, which was given the scientific

200 mg/kg doses served to decrease methane yield by up to 26%. The trial demonstrated that the ingredient can be included in commercial feedlot diets to reduce methane emissions, without negative effects on animal health, performance parameters and carcass characteristics.

"We see the demand for low carbon beef and

The reduced greenhouse emission is equivalent to taking 500 cars off the road.

name 3-NOP.

"This was the largest and longest trial for methane reduction in beef to date. The trial alone reduced greenhouse gas emissions by 1473 tons CO2e. This is comparable to taking 500 cars off the road for a year," said the company.

The trial was conducted by Agriculture and Agri-Food Canada, Feedlot Health Management Services, Viresco Solutions and DSM Nutritional Products, with support from the Alberta Cattle Feeders Association.

Methane reduction

Methane emissions from ruminants represent a significant portion of anthropogenic greenhouse gases and contribute to climate change. DSM hopes its feed ingredient will reduce enteric methane formation in ruminants by over 30% on average.

The trial identified an average 70% reduction in enteric methane emissions when the ingredient was provided in steam-flaked or dry-rolled barley finishing diets at 125 mg/kg of feed dry matter. In corn-based diets, emissions fell by 31-80%.

In backgrounding diets, dairy products increasing globally. We are therefore proud that our methane reduction solution has proven to be highly effective at scale and with this level of impact," said Mark van Nieuwland, Program Director at DSM.

The ingredient has been filed for commercial registration under the name Bovaer.

Indian scientists launch fall armyworm app

As fall armyworm continues to hit corn harvests in India, the Indian Council of Agricultural Research has developed a mobile app to help farmers deal with the pest at each stage of its life cycle.

Fall armyworm can only be managed by through a complex process involving host plant resistance and cultural, mechanical, biological and chemical interventions. Seven insecticides have been approved for this approach, with methods differing depending on the crop.

The app has a surveillance feature allowing field sampling and reporting for moth catching and plant damage.

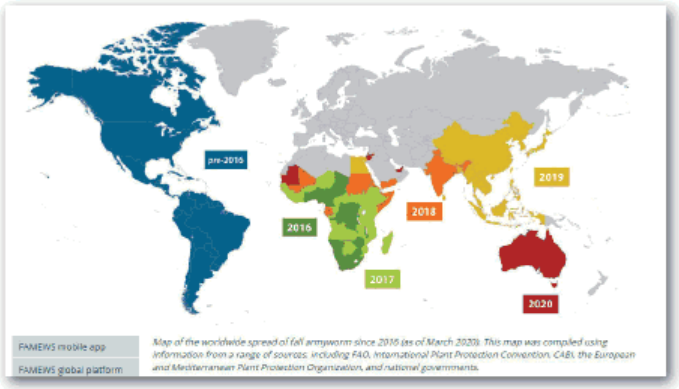
The app is seen as a means of simplifying interventions in corn crops across India.

It helps users identify the different stages of the fall armyworm lifecycle and damage caused to various parts of the plant. It also details ways for farmers to monitor their crops using pheromone traps and field scouting and provides guides for sampling damage caused by the pest.

The app has a surveillance feature allowing field sampling and reporting for moth catching and plant damage. Through this it can compare plant damage across locations.

India was one of eight countries chosen by the FAO to implement a co-ordinated transboundary program in December, with the aim of reducing infestation by 5% across all affected countries within three years, while also decreasing the risk of further spread.

Field studies done by the FAO estimate that the pest risks destroying up to 80 mt of corn worth USD 18 billion annually.

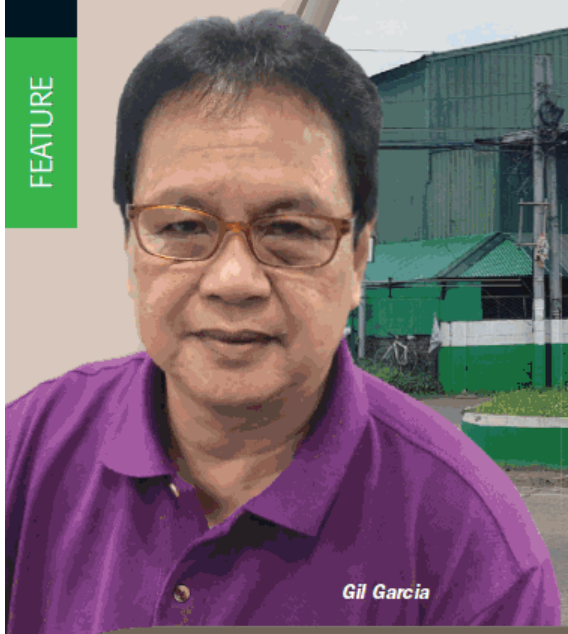


Countries fighting fall armyworm infestation.

FEATURE

Agrichexers rises to the challenge

Agrichexers has focused on customers, products and people to help it weather last year's crises.



Gil Garcia

Brad Brinkworth

Isa Q Tan

The coronavirus crisis caught many people unprepared. But Philippine feed producer Agrichexers Corp had a competitive advantage through its forward-thinking leadership in the face of the pandemic, write BRAD BRINKWORTH and ISA Q TAN.

Businesses are facing increased pressures, notes Gil Garcia, President of Agrichexers. But so too are their customers and communities. Finding ways to help both of these pull

also been problems at times with the supply of ingredients and pricing issues.

"But Chexer Feeds has been fortunate as a preferred customer of

hardship that prompted lower feed consumption. Meanwhile, African swine fever had hit the hog industry badly. Together, the two viruses led to a shrinking feed market, which meant

together in the same direction has never been more essential.

The feed producer has its plant and sales offices in Bulacan, just north of Manila. Its Chexer Feeds brand services a full range of animal species including hogs, poultry, quail, ducks, aquaculture, ruminants and rabbits.

Adapting to the new landscape

"I don't think we've seen anything quite like 2020. We've all had to adapt," said Mr Garcia.

"There has been a big shift to layers, which hasn't been as affected compared to the broiler business and the hog business. There have

ingredient suppliers so that it has not experienced much disruption," he said, adding that the company has urgently moved into innovative areas like feed science.

When the pandemic happened and lockdowns began, Agrichexers' management recognized the challenge and established a tone of sober pragmatism without giving in to fear or panic.

"You can't be frozen, and you can't lose sight of the day-to-day work that needs to be done," Mr Garcia told *Asian Feed Magazine*.

Besides movement restrictions, the pandemic also brought economic

fiercer competition within the feed industry.

"We needed to be more consistent in our product quality and provide better services," said Mr Garcia. "We also adjusted prices and reduced margins to protect our market. We came up with products for non-traditional markets like ruminants, rabbits, native chicken, pets and fish and aquaculture."

Fear can be a company's worst enemy, he observed.

"At the end of the day, we, like many of our industry colleagues, are still problem solvers, no matter what external forces are imposed upon us.

We focus on identifying the problems and finding solutions. When we hit a roadblock, we always believe in finding options to get around it."

Focusing on fundamentals

Mr Garcia noted three main factors that have been critical in allowing Agrichexers to weather the challenges of a year of disruption.

"Number one is our customers," said Mr Garcia. "We needed their trust and loyalty more than ever. To keep them, we needed to sharpen our focus on bringing them the best value products. Margins are always tight, but especially during the pandemic, we needed to do everything we could to help our customers operate efficiently at the lowest cost."

Continuous innovation was central to accomplishing this. Agrichexers uses the latest and best feed biotechnology, including multi-carbohydrase enzyme supplements

Supporting charities brings tremendous purpose and motivation to Agrichexers.

last year was its people.

"The reality is that with the

affected by the hog and broiler industries' problems to invest in

and other bio-based feed additives. These have helped animal producers get the most value possible out of their feed.

"We believe we always need to be leading innovation, so our customers have the best options to maximize their success," said Mr Garcia.

The second fundamental factor the company placed its focus on was ensuring that it produced the right type of ingredients and supplements.

"One of the standout areas of progress has bio-based feed science," Mr Garcia pointed out. "We pride ourselves on working with the best feed science providers to ensure our animal raisers have the best support to succeed."

Agrichexers has its own research farm to test different options and ensure that these are high performing before offering them to customers. The farm includes components addressing all animal species that the company services. Agrichexers has also introduced animal raiser support initiatives such as the Chexers Farm Audit to identify solutions and the Chexers Antibiotic Sensitivity Test.

"All the products that pass our research tests are shown to bring clear value; they either save cost without sacrificing performance or add value by bringing more qualitative and quantitative advantages for our customers," said Mr Garcia.

The third critical factor to its success lockdown, we had many of our staff working from home or working under strong restrictions and protocols. We had to ask a lot from our people and part of making that work was to continue supporting them as much as possible. You have to treat people well."

Better days ahead

As pandemic-related restrictions ease and economic activities resume, Mr Garcia believes things will improve.

"There will be more money in circulation. The layer industry has not been affected during this time, but we expect some glut in the future because of expansions even at the backyard level," he said.

He said the company has been encouraging backyard customers small-scale layer operations.

"They can raise 100-1000 heads to serve their local markets. This is easier to manage and can result in better cash flow. The eggs will be fresher, with better yolk and albumin quality, compared to those produced by big farms."

And because they will market directly to customers, they can get better margins.

"The good thing about eggs is that they are the cheapest protein source, and they aren't threatened by imports or smuggling. Eggs will continue to enjoy a fair share on Filipino tables," Mr Garcia added.

Finally, with the changing attitudes of Filipinos towards pets, Mr Garcia sees opportunities for lower priced, but good performing, pet food on the market. AF

Progress with purpose

Agrichexers Corp has established a reputation as a leader in corporate social responsibility, with a strong charitable component to its operations.

For the last seven years, this has included directing a portion of its profits to support initiatives for children. The company has established and funded feeding and computer literacy programs at a local elementary school. It has also established an orphanage and daycare center, with its profits supporting operations.

The charitable component brings tremendous purpose and motivation to the business, said Gil Garcia.

"Our efforts in giving back reflect values critical to all aspects of the company. We know we can't do this if the company is not earning enough. When times are tough, we believe we need to band together more than ever to keep this support at a high level," he said.

Is insect meal a good and cost-effective alternative protein?

Usman Elahi

The insect meal industry in Asia has over the last few years gained significant traction. This is driven by growing interest to replace conventional protein sources, such as soybean meal and fishmeal, in poultry feed formulation.

Asian Feed Magazine looks at what nutritionists and researchers think of its on-farm application.

Yellow mealworm

Usman Elahi, a Pakistani nutritionist has been experimenting with insect meal in the diets of broiler chicks. He said his trials in China with yellow mealworm, showed that insect meal improved feed efficiency and average growth performance of poultry.

"Chicken fed on insect meal, utilized amino acids more efficiently as these amino acids are involved in protein synthesis and metabolic processes," he said.

In his experiments, Dr Elahi looked at what the optimal level of insect meal for poultry diets would be. He and his team found that dried insect meal can be used up to 4% and fresh insect meal or insect paste can be used up to 10% in poultry diets for better growth.

Seven hundred day-old Ross 308 male broiler chicks, with an average body weight of 42g, were vaccinated against

Agha Waqar Yunus

Newcastle disease and infectious bronchitis and were randomly allotted to the five dietary treatments (7 pens/treatment and 20 birds/pen) and raised on the floor with wood shavings as bedding material.

Ingredient levels of starter and grower phase diets using yellow mealworm.

Ingredients (% as Fed Basis)	Mealworm Inclusion							
	Starter Phase				Grower Phase			
	0%	2%	4% a	8%	0%	2%	4% a	8%
Corn	56.5	58	59.5	62.5	59.7	61.2	62.8	65.8
Soybean meal (43%)	31.5	28.7	25.9	20.3	26.2	23.4	20.6	15
Yellow mealworm	0	2	4	8	0	2	4	8
Rapeseed meal	3	3	3	3	4	4	4	4
Cottonseed meal	2	2	2	2	2.5	2.5	2.5	2.5
Vegetable oil	2.9	2.15	1.42	0	3.96	3.22	2.46	0.97
Di-Calcium phosphate	1.81	1.74	1.68	1.54	1.51	1.45	1.38	1.25
Limestone	1.28	1.33	1.39	1.49	1.21	1.26	1.31	1.42
Salt	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
DL-methionine	0.21	0.21	0.21	0.22	0.12	0.12	0.12	0.12
L-lysine HCL	0.14	0.16	0.18	0.23	0.14	0.16	0.19	0.24
Threonine	0.03	0.03	0.03	0.04	0.02	0.02	0.03	0.03
Tryptophan								0.01
Vitamin Premix[1]	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Mineral Premix[2]	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Choline chloride (50%)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Nutrient Profile[3]								
Apparent metabolizable energy (kcal/kg)	2950	2950	2950	2952	3050	3050	3050	3050
Crude protein, g/kg	207	208	208	209	193	195	196	197
Calcium, g/kg	10	10	10	10	9	9	9	9
Total phosphorus, g/kg	7.1	7.1	7	6.8	6.5	6.5	6.3	6.1

Available phosphorus, g/kg	4.5	4.5	4.5	4.5	4	4	4	4
Lysine, g/kg	11.28	11.45	11.56	11.62	10.53	10.71	10.88	10.95
Methionine, g/kg	4.55	4.66	4.59	4.73	3.59	3.67	3.58	3.62
Methionine + cysteine, g/kg	7.63	7.85	7.78	7.84	6.93	7.05	6.89	6.97
Tryptophan, g/kg	2.45	2.28	2.24	2.12	2.13	2.05	1.97	1.95
Threonine, g/kg	6.98	6.85	6.92	7.01	6.59	6.53	6.49	6.58
dEB (mEq/kg) [4]	209.03	196.65	184.32	158.88	188.95	176.55	163.47	135.7

A feed formulation for fresh (10.48%) mealworm corresponded to that of dried 4% mealworm meal (MWM) except for the type of mealworm; [1] The vitamin premix supplied the following per kg of complete feed: vitamin A, 12,500 IU; vitamin D3, 2500 IU; vitamin K3, 2.65 mg; vitamin B1, 2 mg; vitamin B2, 6 mg; vitamin B12, 0.025 mg; vitamin E, 50 IU; biotin, 0.0325 mg; folic acid, 1.25 mg; pantothenic acid, 12 mg; niacin, 50 mg; [2] The mineral premix supplied the following per kg of complete feed: Cu, 8 mg; Zn, 75 mg; Fe, 80 mg; Mn, 100 mg; Se, 0.15 mg; I, 0.35 mg; [3] On 88% dry matter basis, the AME value was calculated, others were analyzed values; [4] dEB (dietary electrolyte balance) = Na+K–Cl.

Yellow mealworm show promising results as an alternative protein in poultry diets.

Four diets containing dried insect meal (0%, 2%, 4%, and 8%) and one diet containing fresh insect meal (10.48%) were formulated. A control diet was also used. Fresh mealworm contained more than 20% crude protein, dried mealworm meal had 50% crude protein – both higher than convention protein sources. The lysine, methionine, tryptophan, and threonine content in dried yellow meal worm were comparable to soybean meal

gains. In addition, it had partial improvement of FCR during the starter phase. There was however, no significant growth performance observed in the latter stages of the growth phase.

Tests done on carcass composition showed that the use of mealworm dried or fresh did not disturb carcass characteristics. They however noted that abdominal fat percentage was significantly reduced by the diet containing 10.48% fresh mealworm compared to 4% dried mealworm meal.

Dr Elahi sees insect meal as a sustainable and commercially viable alternative protein source in poultry diets. "It is also cost effective as it can be grown on food waste, in a limited space with minimum resources compared to other protein

Nutrient profile of yellow mealworms.

Items	Fresh Mealworm	Dried Mealworm Meal
Dry matter (%)	36.41	95.40
Crude protein (%)	20.15	52.89
Crude fat (%)	11.49	30.05
Calcium (%)	0.096	0.25
Phosphorus (%)	0.28	0.74
Gross energy (kcal/kg)	2132	5586
Amino Acids (%)		
Aspartic acid	1.59	4.20
Threonine	0.77	2.01
Serine	0.85	2.26
Glutamic acid	2.37	6.2
Glycine	1.02	2.73
Alanine	1.49	3.9
Cysteine	0.27	0.70
Valine	1.13	2.99
Methionine	0.25	0.63
Isoleucine	0.88	2.30
Leucine	1.46	3.85
Tyrosine	1.32	3.44
Phenylalanine	0.68	1.77
Histidine	1.10	2.91

The results showed that dried yellow mealworm had a linear and quadratic effect on starter body weights and average daily

sources," he added.

Locust meal

Pakistan which has been plagued with locusts since

Lysine	1.08	2.8
Arginine	1.03	2.73
Proline	0.59	1.62
Tryophan	0.14	0.36

Broiler chicks showed higher growth performance when insect meal was included in the starter diet, according to a research.

Items[a]	Mealworm Meal Inclusion						*P*-Value	
	0%	2%	4%	8%	10.48%	Linear[b]	Quadrartic[b]	t-Test[c]
Starter								
BW (g)	619±12.8	605±11.5	664±16.6	609±19.1	610±11.1	0.033	0.019	0.036
ADG (g)	27.6±0.60	26.9±0.57	29.5±0.82	26.7±0.94	27.2±0.53	0.027	0.016	0.024
ADFI* (g)	39.1±0.70	38.7±0.78	41.5±0.89	40.9±1.08	41.4±0.50	0.310	0.130	0.680
FCR	1.42±0.02	1.44±0.02	1.41±0.02	1.54±0.04	1.53±0.03	0.030	0.055	0.002
Grower								
BW (g)	2213±48.7	2219±43.6	2253±62.3	2219±45.3	2273±29.8	0.861	0.692	0.753
ADG (g)	74.2±2.03	75.4±1.93	74.9±2.37	75.5±2.24	77.5±1.35	0.949	0.778	0.347
ADFI* (g)	163.2±2.73	161.7±3.20	163.8±2.12	161.4±3.79	1.53±0.03	0.840	0.569	0.106
FCR	2.21±0.06	2.15±0.03	2.20±0.06	2.15±0.06	2.05±0.04	0.668	0.374	0.143
Entire feeding period								
ADG (g)	48.8±1.04	48.8±0.76	50.2±1.38	48.6±1.17	50.2±0.78	0.550	0.386	0.898
ADFI* (g)	95.6±1.14	94.2±1.48	97.2±1.15	94.8±1.71	95.0±0.82	0.343	0.157	0.102
FCR	1.96±0.03	1.93±0.02	1.95±0.04	1.96±0.03	1.89±0.02	0.816	0.757	0.441

* Feed intake was adjusted to 88% dry matter basis; [a] BW, body weight; ADG, average daily gain; ADFI, average daily feed intake; FCR, feed conversion ratio (feed: gain, g:g);
[b] Linear and quadratic effect of dried MWM supplementation were evaluated using regression analysis; [c] t-test of 4% dried MWM and 10.48% fresh mealworm.

Increasing mycotoxin threat needs integrated management

Although the occurrence of mycotoxins varies by the year, their presence has

ochratoxin, deoxynivalenol, fumonisin, zearalenone and trichothecene mycotoxins contained two or more types.

The survey proved that "mycotoxin co-occurrence is a rule and not an

Dr Swamy Haladi

been on the rise due to global warming and unseasonal rains, according to Swamy Haladi, Global Program Manager for Mycotoxin Risk Management at Trouw Nutrition.

He believes excess rainfall during silking seasons and drought during growing season are central to being able to determine mycotoxin concentrations in different years.

Quoting results of a 10-year global mycotoxin survey from 2019, Dr Haladi said almost two-thirds of the 74,821 samples of feedstuff from 100 countries tested for aflatoxin, exception," he said in a webinar.

In addition, masked mycotoxins should not be underestimated. High proportions of these co-occur with their parent forms in some cereal-based foods and feedstuff, increasing total exposure and posing additional health risks to humans and animals, Dr Haladi said.

"Those masked mycotoxins, which are hydrolyzed into their parent forms by intestinal microorganisms in animals, are just as toxic as free forms and lead to unexpected higher toxicity.

"Understanding mycotoxin interactions will help us be proactive in taking measures to prevent and manage mycotoxins effectively," he added.

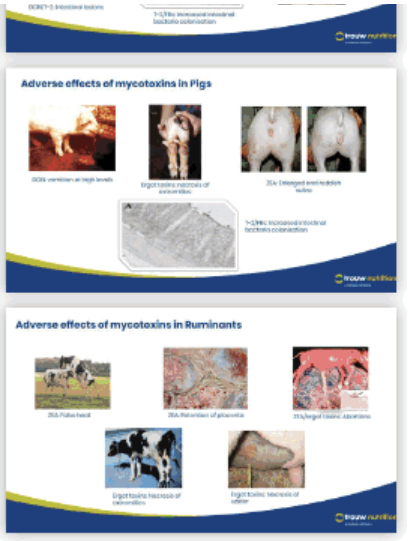


Photo courtesy of Trouw Nutrition.

◁ 2019, recently started experimenting with another insect meal.

Agha Waqar Yunus, researcher at the Islamabad based Pakistan Agriculture Research Council said they have conducted two trials with locust meal. In the first trial they did not balance with amino acids and in the second they did. In each trial, locust meal ratios were increased by 4%, 8% and 12%, and this was balanced with corresponding soybean meal ratios. A control diet with 30% soybean meal and no locust meal was also performed for both trials.

The results, according to Dr Yunus was in favor of the locust meal when it is balanced with additional amino acids. Birds on the 12% locust meal formula gained 135g more weight than birds in the soybean meal control group at five weeks. In addition, the birds were healthier and their liver color was good.

"This is a significant difference," said Dr Yunus, adding that insect meal would be ideal for starter diets in poultry as chicks do better with the replaced with locust meal. He observed that increasing it to 16% should be sufficient to remove soybean meal from the formula.

"If this works, it will save a lot of money for feedmillers. We can also remove the mycotoxin risk that raw materials like soybean meal bring to the diet," he added.

Challenges

Studies have confirmed that palatability of these alternate ingredients to animals is good and they can replace 25-100% of soybean meal or fishmeal depending on the species. However, there are a few points to consider when switching to alternative proteins.

Firstly, insect meals are deficient in methionine and lysine and feedmillers need to supplement these when formulating insect meal diets. The ratio would depend on the insect.

Dr Yunus for example found that locust meal needed lysine and methionine supplementation. growing animals and laying hens.

Another factor to consider is the supply - will feedmillers have enough insects to make the required quantities of meal? In Pakistan, the locust plague is expected to continue for the next 2-3 years, and thus supply is available for now, but for future supply, insect farms would be needed.

Dr Elahi said many mainstream feedmillers have started to use locust meal in their feed due to cheap supply but this trend is short term. "We need more sustainable ways of sourcing insect meal to ensure a long-term switch," he said. AF

higher protein content.

Dr Yunus is now working on a trial where soybean meal is completely

Besides, insects like mealworms are deficient in calcium and will need it to be supplemented, especially for

Poultry carcass quality undisturbed in trials with yellow mealworm diet.

Phosphea takes Nuwen animal nutrition under its wing

Groupe Roullier has announced that its Nuwen animal nutrition activities will be parked under its Phosphea brand.

The new structure was streamlined to strengthen the range of nutritional solutions based on macro-minerals for all animals. *Asian Feed Magazine* spoke to Pol Abiven, Phosphea's Director for Asia-Pacific about the


Pol Abiven

support to our partners for both Phosphea and Nuwen animal feed ranges," he

- Performance: specialty feed phosphates and minerals, adapted to species and industrial needs (CalseaPowder, MAP, Sodium Phosphates, Magnesium Phosphates)
- Evolution: Innovative mineral solutions to assist in farm performance, health and animal well-being (CalseaGrow)

swine, ruminants, aqua and pet food," he iterated.

Meanwhile, Phosphea CEO Yohann Becker also added: "Thanks to this change in our organization, we will be able to accelerate the development of innovative solutions adapted to the issues of our customers while continuing to be a reliable partner for the supply of their essential

Asia-Pacific about the merger.

He said as the company serves 16 countries in Asia-Pacific, the merger of Phosphea and Nuwen will create synergies between both entities' sales and support teams, commercial and technical networks. It will reinforce the teams to further develop themselves in the region.

"From our local bases in Malaysia, India, China, Thailand and Vietnam, we will be now be able to provide commercial, logistics and technical

animal feed ranges," he added.

In terms of image, offering and reach in the Asian market, Mr Abiven commented that by joining forces, the company can offer partners a broader range of feed raw material solutions.

These come as:

- Essentials: Inorganic Feed Phosphates and other minerals raw materials for well-being of animals (Inorganic feed phosphates, Calcium carbonates, Sodium bicarbonate, Urea and Salt)

(CalseaGrow)

"We provide solutions for all species – poultry and

supply of their essential raw materials."

Adisseo completes Framelco acquisition

Adisseo has completed the acquisition of Framelco, the Dutch feed additive company.

Family-owned Framelco runs three plants in the Netherlands, Spain and Thailand, and has been returning sales of around USD 36 million. Most of its business involves the sale of glycerides and lysolecithins.

"This complementary combination supports our strategy for accelerating growth of our Specialty products business. Together, we will set up an efficient organization which will reinforce Adisseo's position in the promising Health by Nutrition market segment," said Adisseo's Chief Executive, Jean-Marc Dublanc.

Adisseo revealed last September that it had signed an agreement to acquire Framelco. This followed its acquisition in 2018 of Belgian feed additive producer Nutriad.

"Now that we have confirmed the completion of the transaction, Adisseo and Framelco teams will jointly work with full energy and passion on synergies implementation," said Framelco's Chief Executive, Lars Snijders

EW Nutrition launches new xylanase enzyme

Jurek Grapentin

EW Nutrition has launched a new intrinsically thermostable xylanase, Axxess XY, in Malaysia.

By breaking down the soluble and insoluble fiber fractions in feed ingredients, the enzyme offers high flexibility in feed formulation while lowering costs, the manufacturer claims.

"This next-generation xylanase enzyme is a testament of our dedication to provide holistic animal nutrition solutions to our valued customers in Southeast Asia," said Jurek Grapentin, EW Nutrition's Regional Director for Southeast Asia-Pacific.

Impex introduces water detection system

Impex has launched a new detection system that sounds an alarm when the drinking line is empty.

The system uses water's electrical conductivity to detect when there is no water between two of up to eight contact points.

"This means the end-sets no longer need to be checked manually. Users can see at a glance where drinking water is present in the lines," the company said in a statement.

The Impex water detection system monitors water levels.

Early nutrition crucial for layer pullets

Efficient management during the rearing period can maximize genetic potential for layers, according to Biomin's Poultry Technical Manager Andrew Robertson.

"You can't ever improve on genetic potential, you can only subtract. If you are getting 430 eggs in 100 weeks and the genetic potential in 480, it means your management is costing 50 eggs. Although laying potential will always fluctuate, working on the management will increase the profitability factor," Mr Robertson said in a webinar.

The rearing period should be treated as a time for investment, not for costs, with a focus on producing point-of-lay pullets with the correct body weight and physical development to sustain a long production cycle.

Birds should also have appropriate immunity for the laying cycle in the face of all prevailing disease challenges. In addition, they should have developed appetites to eat sufficiently during the early laying cycle.

There is correlation between bodyweight at 4-weeks of age and overall flock performance. Indeed, any weight lost during the first week of growth will not be recovered.

Mr Robertson recommended investing in pre-starter feeds that utilize digestible proteins, probiotics and amino acids for pullets. He also suggested using crumble feed for the first few weeks, rather than mash, and pointed out that feed changes should take place according to body weight, and not age.

Biomin introduces product for mycotoxins in finishers

Biomin has launched a new mycotoxin and endotoxin deactivation product, Mycofix Pro-tect, for the fattening period in pigs and broilers.

"More of our customers are becoming aware of the effects that mycotoxins can have in fattening animals," said Ursula Hofstetter, Head of Global Product Management for Mycotoxins at Biomin.

"Although fattening animals have shorter lifespans than breeding animals, mycotoxins can still have devastating effects on them and, consequently, on producers' profits."

Mycotoxins are found in feedstuffs at levels below regulatory limits. Even at low levels, they can have damaging effect on animal health, welfare and performance.

Mycotoxins target gut integrity and allow the entrance of pathogens into the intestinal track, resulting in decreased nutrient uptake and less weight gain.

"In addition to damaging gut integrity, mycotoxins can disrupt herd and flock uniformity, damage the immune system, contribute to vaccine failure and increase bacterial contamination of carcasses," said Hofstetter.

Corn gluten feed market shows solid growth

The global corn gluten feed market is expected to be worth around USD 9.3 billion by 2027, averaging 4.1% growth each year from 2020, according to Coherent Market Insights.

Increasing demand for animal feed will fuel growth.

Gluten feed products are in high demand as environmental awareness grows among more health-conscious consumers.

At the same time, increasing consumption of poultry meat and other proteins will drive growth in the corn gluten feed market, the report said.

Wet corn gluten feed in particular is expected to see a rise in demand. It is produced through a wet-milling process that wastes little of the corn kernel and results in high-value corn oil.

The germ meal that remains after oil extraction is used

In addition, high endotoxin loads in an animal's gastrointestinal tract contribute to inflammation, effectively wasting energy that would otherwise go into growth.

Biomin's Mycofix line uses adsorption, biotransformation and bioprotection to guard against the harmful effects of mycotoxins and endotoxins.

Diamond V introduces poultry research director

Diamond V, Cargill's nutrition and health offshoot, has hired Timothy Johnson to be its Director of Poultry Research and Technical Support.

Dr Johnson brings nearly 25 years of experience in mitigating antibiotic resistance in poultry, microbiology, pathogen genomics and preventive veterinary medicine.

for animal feed, along with other byproducts.

Trouw appoints new GM for Indonesia

Wully Wahyuni has been named General Manager of Trouw Nutrition in Indonesia.

Mrs Wahyuni, who is the first Indonesian to assume the role, joined the company in 2019 to expand Trouw's technical expertise and take business into new markets.

"Under her leadership, we believe the company will continue to grow," said Jurriën Zandbergen, Managing Director Trouw Nutrition Asia-Pacific.

Wully Wahyuni

TECHNICAL

The influence of feed grains in reduced crude protein broiler diets – wheat versus maize

Shiva Greenhalgh

Sonia Liu

Peter Chrystal

Peter Selle

SHIVA GREENHALGH, SONIA LIU, PETER CHRYSTAL and PETER SELLE* review the compositional differences between wheat and maize, and how these factors might influence broiler performance in the context of reduced-CP diets.

Globally, maize and wheat are the major cereal grains used in broiler feed. Maize is predominant in Asia and the Americas, whereas wheat is in Australia, New Zealand and Europe. Extensive research has been undertaken in refining dietary strategies to optimize broiler performance when offered reduced crude protein (CP) diets. In feed, these grains have been optimized by the inclusion of feed enzymes and unbound (crystalline or synthetic) amino acids. Reduced CP diets have demonstrated beneficial outcomes in enhancing litter quality, minimizing foot pad dermatitis as well as reducing nitrogen emissions.

Despite improvements in the formulation of reduced CP diets poor bird performance is still observed in CP levels < 180 g/kg. Underlying factors are often attributed to potential deficiencies in amino acids, including valine, isoleucine and arginine. To date, comparative studies evaluating the influence of wheat and maize within the context of reduced-CP diets have not been completed.

A series of reduced-CP diet feeding studies have been completed by the Poultry Research Foundation. Step-wise reductions in CP from about 210-165g/kg were evaluated, without the inclusion of feed enzymes. The growth performance of birds offered the lowest maize-based diets have been compromised but only to limited extents. This was also the case with the first wheat-based study; however, in two subsequent studies bird performance was notably compromised. Thus, the impression was formed that maize- based diets are more conducive to reductions in CP than wheat-based diets. ▷

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Wheat versus maize – influencing factors on broiler performance

In poultry feed, environmental and economic factors have typically dictated the use of maize and wheat geographically. However, maize has been preferred due to the perception that maize has a greater nutritional value compared to other grains. Cereal grain composition is variable in terms of starch, protein, fiber, oil and amino acids content, much of which is influenced by intrinsic and extrinsic factors such as growing conditions, variety type, starch structure, drying temperature and anti-nutritive factors. The relevant properties of maize and wheat are shown in Table 1.

Interestingly, despite compositional differences, bird performance is relatively equivalent when fed standard CP levels of > 220 g/kg between the two grains (unpublished data). However, In the context of reduced CP diets, two recent studies (as yet unpublished) suggest that the compositional differences between wheat and maize have a direct influence on bird performance, namely in feed conversion ratio,

Table 1: A comparison of the properties of maize and wheat *in vitro* and *in vivo*.

Parameter	Maize	Wheat
Giuberti *et al.*, 2021	(n = 14)	(n = 12)
Starch (g/kg)	703	614
Protein (g/kg)	81	136
Starch: protein ratio (g/kg)	8.68	4.51
Amylose (%)	31.1	29.4
Fat (g/kg)	40	16
Starch digestion rate (g/minute)	0.017	0.135
Potential starch digestibility (%)	95.0	92.8
Predicted glycaemic index	39.5	70.4
Rapid starch (%)	20.9	29.5
Slow starch (%)	52.1	61.8
Resistant starch (%)	27.1	8.6
AminoDat 5.0	(n = 11)	(n = 15)
Arginine (g/kg)	4.3	5.5
Histidine (g/kg)	2.6	2.7
Isoleucine (g/kg)	3.2	3.9
Leucine (g/kg)	12.0	7.7
Lysine (g/kg)	2.6	3.3
Methionine (g/kg)	1.9	1.8
Phenylalanine (g/kg)	4.8	5.3
Threonine (g/kg)	3.2	3.4
Tryptophan (g/kg)	0.7	-
Valine (g/kg)	4.2	5.0
Alanine (g/kg)	7.0	4.2

bird weight and feed intake. These studies have shown that birds offered wheat- compared with maize-based diets performed more poorly ($p < 0.001$). In the initial study, birds were offered 180 and 162.5 g/kg CP wheat-based diets, with starch capped or uncapped. Birds offered wheat-based diets had decidedly inferior performance compared with birds offered maize-based diets. In a subsequent study, reduced CP levels (165 g/kg) wheat- or maize-based diets were offered to male broilers from 7 to 35 days post-hatch. Inferior ($p < 0.001$) performance was again observed in birds offered wheat-based diets. In both studies, such observations were not anticipated, but highlight a need to understand the underlying causes.

The literature on reduced CP diets often attributes poor bird performance to amino acids deficiencies. Whilst this may be the case in certain circumstances, other factors should be considered since the chemical and nutrient composition between maize and wheat differ. Of these factors, possibly three are of greatest importance.

Alanine (g/kg)	7.0	4.2
Aspartic acid (g/kg)	6.0	6.0
Cysteine (g/kg)	2.1	2.7
Glutamic acid (g/kg)	17.6	32.5
Glycine (g/kg)	3.3	4.9
Proline (g/kg)	8.8	11.5
Serine (g/kg)	4.5	5.3
Tyrosine (g/kg)	-	-
Crude protein (g/kg)	118	91
Truong *et al.*, 2016		
Ileal digestibility coefficient	0.950	0.916
Minimum	0.873	0.790
Maximum	0.993	0.990

Crude protein content

The first and most pertinent, are the levels of CP and wheat contains 51% more CP than maize (Table 1). Within the context of reduced- CP diets, wheat-based diets contain large amounts of unbound amino acids that may lead to imbalances of amino acids at sites of protein synthesis. Amino acids in excess have been shown to impede broiler performance in reduced CP wheat-based diets, by inducing ammonia toxicity. Blood ammonia levels regulate feed intake via the central nervous system. It is theorized that surplus amino acids undergo deamination, mostly in the liver, producing ammonia that is needed to be detoxified via a condensation reaction in which ammonia and glutamic acid are converted to glutamine and excess nitrogen subsequently excreted as uric acid. Higher concentrations of ammonia in the systemic plasma has been observed to depress feed intake, resulting in reduced liveweight gain and inferior feed conversion ratios.

Starch digestibility

The second factor is the competition of nutrient uptake in the intestine between glucose and unbound amino acids. This stems from the rate of starch digestion whereby wheat is more rapid than that of maize (0.118 versus 0.08 min^{-1}; $p = 0.048$). Furthermore, feed grain content increases in reduced-CP diets, diminishing the capacity factor which pertains to the issue of gut viscosity as a result of increased wheat inclusion. The aim of reduced CP diets is to reduce CP through minimization of soybean meal, whilst increasing feed grain. Increases of wheat have a greater negative influence compared to maize. Unlike wheat, maize has very low levels of soluble non-starch polysaccharides (NSP). Soluble NSP is an anti-nutritive amino acids. Wheat starch is more rapidly digested than maize starch, which may have negative impacts on intestinal uptakes of unbound amino acids. Wheat contains more soluble NSP than maize and the potential to increase gut viscosity, but this adverse effect can be addressed with exogenous enzymes.

These factors highlight a need for further research to better understand

CP diets, diminishing the capacity of the bird to efficiently absorb nutrients since glucose and amino acids compete for co-absorption via common Na^+-dependent transport systems. It is theorized that slowly digestible starch in maize-based diets may spare amino acids from catabolism in the gut mucosa and therefore enhance the post-enteral availability of amino acids. In addition, slowly digestible starch activates nutrient sensing mechanisms related to unabsorbed nutrients such as the ileal brake, thereby enhancing the extent of digestion by increasing transit time.

Gut viscosity

Following on from this is the third factor, and is understood to increases digesta viscosity, which has been shown to hinder bird performance as it negatively impacts digestion and nutrient absorption.

Conclusion

In the context of reduced-CP diets, the higher levels of feed grain inclusions, wheat and maize have not been sufficiently considered. Composition differences between wheat and maize may influence broiler performance, by virtue of differences in crude protein and starch digestive dynamics. The higher unbound amino acid levels in wheat-based, reduced CP diets may increase plasma ammonia levels following deamination of unbalanced, surplus the influence of feed grain in the context of reduced- CP diets and how that impacts on broiler performance. This will hopefully allow for enhanced dietary strategies that can be implemented. AF

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TECHNICAL

Exploring the true value of phytase: phosphorus and beyond

USAMA AFTAB* outlines new applications and benefits of phytase in animal feed. The complete destruction of dietary phytate has been made possible through higher doses of efficient phytases, and attaining the objective of complete phytate hydrolysis adds substantially to the net commercial

core objective i.e. making phytate bound P available to the animals. The scientific developments in basic

returns and environmental benefits associated with phytase use.

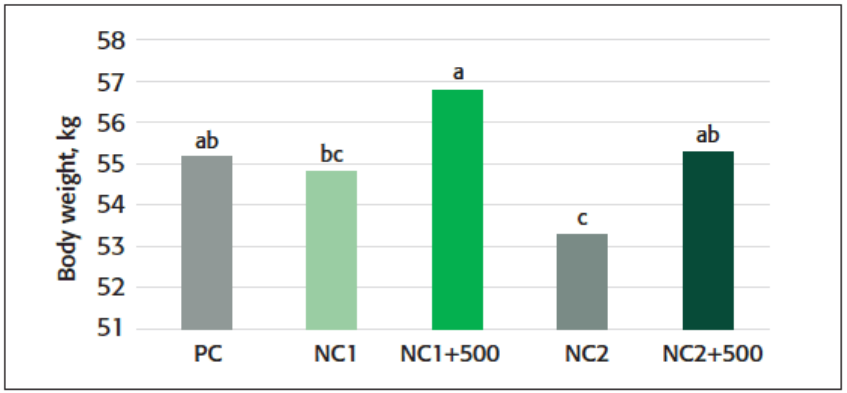
The integration of exogenous phytase into the feed industry in the early 90's was driven by an increased demand to cap phosphorus (P) excretion by intensive poultry and pig production. In the following years, the research interest in this field opened up new avenues, exploring the value of phytase beyond phosphorus. During these years, a wealth of published information was presented suggesting that the benefits of phytate breakdown were manifold and encompasses 'sparing' of other mineral cations, energy, and amino acids in addition to its benefits from a commercial but

and applied research in this field constantly shaped the way phytases were perceived and used by the commercial feed industry; hence, it is not surprising that today the phytase molecule itself and its practical application is very different from what it had been at the time of its first use.

Reliance on inorganic phosphates – down to none!

For almost two decades post-introduction, use of 500 FTU of phytase targetting 'release' of 0.10-0.12% available-P remained the industry norm. Developments of new phytases capable of releasing higher-P-for-dose (FTU) were introduced and high-dose application of these phytases was explored, making extensive phytate hydrolysis a possibility. This resulted in renewed interest in further removal of inorganic phosphates which not only brings

Figure 1: Effect of 500 FTU phytase when added to diet reduced either in P/Ca (NC1) or P/Ca/AME/AA (NC2) on growth of pigs.



the published information, the improvements attributed to phytase range from 40-150 kcal of AME per kg of diet and from 2-4% increase in apparent ileal digestibility of AA. Figure 1 summarizes the results of a study demonstrating complete recovery of growth performance when 500 FTU were added to negative control (NC) diet formulated with reduced P, Ca, AME, and AA corresponding to the proposed matrix-for-dose of the phytase. Since AME and AA are the key cost components in poultry and pig diets, application of the energy and AA matrix of phytase results in ▷

also an environmental perspective. A series of studies by AB Vista demonstrated 1000-1500 FTU of phytase was sufficient to support optimal growth performance and bone mineralization of broilers fed all-vegetable diets practically devoid of supplemental inorganic phosphates. One of these studies observed optimal body weight gain and feed efficiency of broilers when 1500 FTU of an enhanced *E. coli* phytase was supplemented to a corn-soy diet containing 2.6 kg dicalcium phosphate (DCP) per metric tonne for starter (1-10 d) with no added phosphate for grower (11-25 d) or finisher (26-42 d) diets. These results were in line with a preceding study in which all the supplemental inorganic phosphate in the grower (15-28 d) and finisher (29-42 d) diets was removed and replaced with 1500 FTU of phytase in a high phytate corn, soy, rice bran diet; the starter (0-14 d) diet in this experiment had marginal (1.2 kg per metric tonne) added DCP. This was already several years after the idea of zero-dependence on inorganic phosphates was demonstrated for laying diets. Given the value created with such a strategy, it is reasonable to predict that the future poultry industry will have very little, if any, reliance on supplemental inorganic phosphates.

Application of complete nutrient matrix

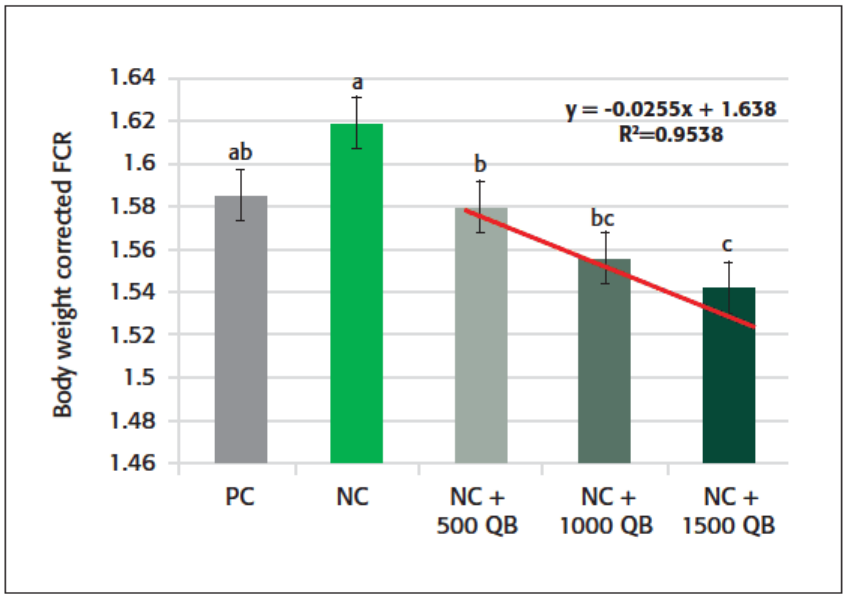
Improved digestibility of energy (apparent metabolizable energy, AME) and amino acids (AA) by phytases has been well documented. Based on

feed cost savings in the range of USD 10-15/ton of feed.

Phytase for improved performance – superdosing

There is evidence to suggest that targeting almost complete hydrolysis of phytate could improve feed efficiency. Figure 2 is based on the average of six independent broiler studies conducted using similar design to explore the potential of incremental doses of an enhanced *E. coli*-derived phytase beyond the standard 500 FTU. The set of trials included a control diet (PC) formulated to industry standard nutrients without phytase. In the negative control (NC) the level of available phosphorus and calcium were reduced to the proposed matrix of 500 FTU of the test phytase (-0.15% available P and -0.165% Ca). The data suggested that 500 FTU of phytase had a similar feed efficiency to that of PC (and this is how the majority of the feed industry uses a phytase in practice) but increasing the dosage over and above 500 FTU resulted in a linear improvement in the feed efficiency – with an average four points improvement in weight corrected FCR at 1500 FTU (super-dose) compared

Figure 2: Effect of phytase superdosing on body weight corrected FCR in broilers.



possibly lead to better 'gut-health'; 1) phytate hydrolysis improves amino acid digestibility resulting in less undigested nitrogen to enter lower gut; this would likely suppress nitrogen-fermentation which is often associated with pathogenic strains, and 2) complete phytate hydrolysis has been associated with up-regulation of intestinal alkaline phosphatase (AP), possibly through increased supply of lower IP-esters especially IP1 and/or via its 'sparing' effect on Zinc and Magnesium which are the key metals for the activation of AP. AP has been shown to reduce antigenicity of bacterial endotoxin lipopolysaccharide (LPS) as e.g. demonstrated in *E. coli* challenge models.

Phytase and litter quality

the results of one of these studies showed improved litter scores and lowered incidence of footpad dermatitis with a superdose of phytase. It is probable that these observations are linked to the effect of phytase on improved gut-health as discussed above.

Phytase and improved reproductive efficiency

Trial work at AB Vista explored the effect of a high dose of phytase on reproductive performance of poultry and pigs. It was hypothesized that phytate hydrolysis may influence reproductive efficiency via, 1) improved availability of trace minerals crucial to fertility and hatchability, and 2) provision of inositol which has multiple effects on metabolism of glucose and

with 500 FTU (conventional) phytase treatment; under most commercial scenarios, an improvement of four points weight corrected FCR is equivalent to feed savings worth of USD 10-12/ton. The superdosing benefit appears to relate to the release of nutrients and provision of inositol associated with an almost complete phytate hydrolysis in the gut.

Phytate hydrolysis and gut-health

There are two ways phytase, especially at dose commensurate to extensive phytate hydrolysis, could

Wet litter is one of the common husbandry problems in intensive poultry and pig production causing significant financial losses. These losses are associated with reduced end-product quality, increased infection levels, culls and reduced growth rates. The correction of the problem requires careful attention to multitude of factors, including nutrition. University and field trials conducted by AB Vista suggests the use of phytase in general, and superdose (~1500 FTU) in particular, may help reduce the incidence. Comparing 500 FTU (conventional dose) with 1500 FTU (superdose),

fats and antioxidant properties. Supporting the above proposal, we observed a significant increase in concentration of Selenium and Zinc in the yolk of commercial layers with diets supplemented with 1500 FTU phytase compared with un-supplemented controls. The observation that 2000 FTU increased semen concentration of PIC boars by 17% and number of doses per collection by 11% compared with control (fed conventional 500 FTU) also demonstrates the value created by superdosing. Further substantiating the original hypothesis, work

conducted in France using broiler roosters demonstrated a significant increase in percentage of live spermatozoa at 51 weeks of age which tended to be maintained to 61 weeks of age in a group fed a diet supplemented with 1300 FTU of an enhanced *E. coli* phytase compared with those receiving 500 FTU of a standard wild-type *E. coli* phytase.

Ingredient flexibility

Animal protein meals are often expensive but are occasionally forced in specific rations in view of their high digestibility and palatability. Examples of these applications are the use of spray-dried-plasma to promote early feed intake in nursery piglets or specific aqua feeds where animal protein sources like fish meal, feather meal, or poultry by-product meals are incorporated,

Conclusion and notes

Phytase is perhaps one of most extensively researched feed additive. It is unique in terms of the coverage of benefits it potentially offers and that these benefits are well beyond, and several-fold in order of what it was initially intended to offer. The commercial returns of phytase use range from USD 2-4/ton of feed given the target was to 'spare' P, to USD 10-15/ton when the full nutrient matrix is applied or the enzyme is super-dosed for improved growth performance, to as much as USD 100/ton when it replaces 3% spray-dried-plasma in nursery piglet diets. Smart use of phytase promises enormous commercial and environmental benefits. AF

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sometimes even against cost gradient. In such cases, easing out the ingredient constraints often results in significant replacement of these expensive feed ingredients by cheaper plant-based proteins. Increasing the dietary level of vegetable protein meals at the expense of animal proteins offers significant feed cost savings but raises the concern of poor growth performance due mainly through increasing concentration of fibre and phytate in these diets.

A study conducted with a large integrator in the USA demonstrated that 2000 FTU phytase completely recovered the loss in weight gain and feed efficiency of nursery piglets as a result of a 6 and 3% replacement of spray-dried-plasma with soybean meal respectively for 1 to 7, and 8 to 21 d post-weaning. Likewise, in a phytase dose-response study conducted in Thailand, we observed that supplementation of 4500 FTU to negative control diet (no fish meal) restored growth performance of African catfish to that of the experimental control (10% fish meal). These findings suggest that high dose of phytase may be used as a tool to mitigate the high prices of animal protein without compromising the growth performance in a number of animal species.

TECHNICAL

approach to improve gut health

Step 1 of 3

Improving drinking water and feed raw material quality

Kevin Liu

Edwin Chow

Olga Averkieva

KEVIN LIU, EDWIN CHOW and OLGA AVERKIEVA*

present the first of the three-step approach to improve gut health in animals. They explain how feed additives can help improve the quality of feed raw materials by reducing microbial contamination, oxidative stress and mycotoxins.

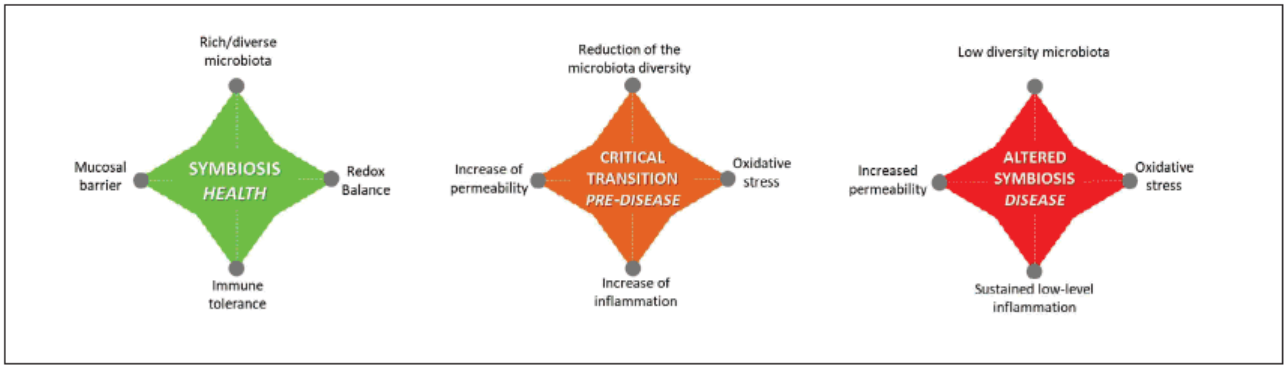
Gut health is a multi-factorial topic, which can be described as symbiotic relationship among feed quality, gut function and microbiota, including feed digestion, mucosal and barrier function, immune response and redox balance for healthy, pre-disease and disease states (Figure 1).

Many factors can contribute to the symbiotic relationship. Adisseo has developed a broad portfolio of products and services to address gut health issues through a 3-step holistic approach: Step 1 is about feed hygiene, feed/water safety and quality preservation; Step 2 aims at overall

and quality preservation, Step 2 aims at overall feed digestibility and its impact to gut microbiota and health; till Step 3 about animal resilience at farms, and more importantly how to take advantages of better gut health to achieve profitability and sustainability of the animal industry.

Gut health starts from high quality of feed raw materials. Nowadays, various big data and prediction tools allow purchasers to assess true

Figure 1: Alternative stable states and critical transition in the gut microbiota-host symbiosis.



quality of major feed raw materials and additives, so to procure at prices reflecting their true value. On top of nutritional quality, feed hygiene, including microbial and mycotoxin contamination, as well as oxidative status, are closely related to gut health, therefore these important factors should also be in the decision-making process.

Feed quality: Microbial and oxidative deterioration

The quality of raw materials and final feeds is determined not only by its nutritive composition, but little can be done about mold contamination and its subsequent toxin production. However, post-harvest there are several strategies that can be adopted to control the growth and development of molds, in order to reduce their level and effects on raw material quality.

First, mold inhibitors can be applied to control mold growth hence mycotoxin contamination. Proper storage of raw materials in clean and well-ventilated silos is particularly important. Adisseo has cost-effective solutions for grain treatment and feed storage propionic and other organic acids, for effective mold inhibition. The use of Mold-Nil is well-established in preventing mold contamination in raw materials and feed, thereby preserving the nutritive value; as well as allowing safe-handling throughout short and long-term storage.

Second, preventing oxidative deterioration is necessary in feed raw materials and final feeds. Oxidized fats carry aldehydes and peroxides that are harmful to animal immunity and detrimental to gut health. Adisseo has developed efficient strategy to prevent oxidation of lipids or feeds,

also its hygiene quality, namely, microbiological loads. The number of mold spores is a particularly important factor. In the field, before harvest, to prevent mold growth. Mold-Nil, available in both liquid and dry form, is uniquely formulated with a synergistic buffered blend of by combining various ingredients with different strengths and applications, with proven efficacy, to control different parts of an oxidation cycle. ▷

Figure 2: Adisseo comprehensive mycotoxin risk management program.

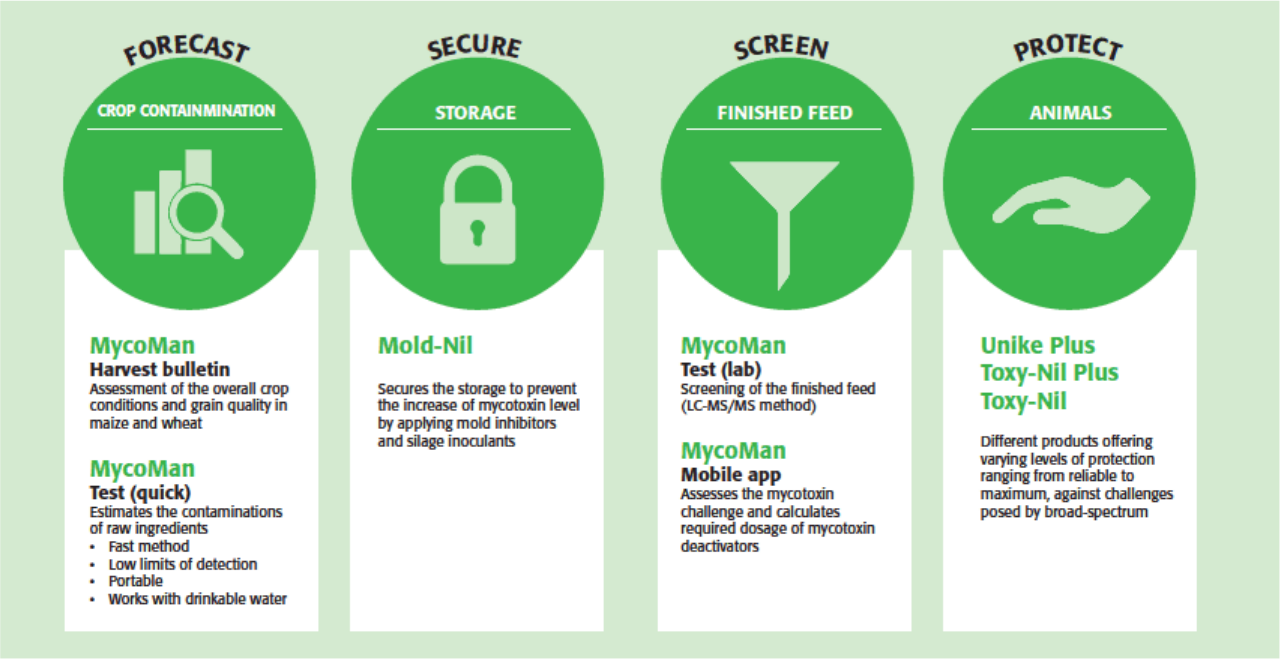


Table 1: Summary of Adisseo corn harvest report 2019.

Mycotoxin		South America	North America	South Europe	East Europe
Aflatoxin B1	Occurrence, %	12	0	5	1
	Average of positive samples, ppb	15	nd	4	6
Deoxynivalenol	Occurrence, %	3	100	43	71

Deoxynivalenol	Average of positive samples, ppb	348	966	189	559
Zearalenone	Occurrence, %	10	35	33	39
	Average of positive samples, ppb	246	528	55	510
Fumonisin B1	Occurrence, %	94	50	20	42
	Average of positive samples, ppb	1085	1772	710	924
T-2	Occurrence, %	0	15	0	63
	Average of positive samples, ppb	nd	30	nd	23
HT-2	Occurrence, %	0	0	0	86
	Average of positive samples, ppb	nd	nd	nd	56
Ochratoxin A	Occurrence, %	0	0	0	0
	Average of positive samples, ppb	nd	nd	nd	nd

nd = not detected

◁ Using proprietary formulations and manufacturing processes, Adisseo provides Oxy-Nil program – Ethoxyquin-based and Ethoxyquin-free antioxidant solutions in both dry and liquid forms. The Oxy-Nil program, maximizing the synergism of selected antioxidant compounds, offers an ideal antioxidant solution for fat-rich raw materials and final feeds.

Mycotoxins harmful to gut health: T-2 toxin and deoxynivalenol

Determining the occurrence and levels of mycotoxins in feed raw materials is a constant challenge. Among the six major categories of mycotoxins, trichothecenes T-2 toxin and deoxynivalenol are harmful to gut health by affecting the intestinal mucosa, intestinal secretions, nutrients absorption, bacteria population, pathogen colonization, and intestinal motility. In addition, even low levels of vaccination efficacy by ingestion of contaminated feed, leaving animals more vulnerable to diseases.

According to Adisseo corn harvest report 2019 (Table 1), deoxynivalenol and T-2 toxins are widely detected in corn samples collected from North America and East Europe. Based on Adisseo's risk estimations on mycotoxin levels, it is worth noting that:

- Deoxynivalenol level in all four origins of corn could potentially impose high risk to young animals such as piglets.
- Deoxynivalenol level in North America corn could potentially impose high risk for breeding poultry and pigs.
- T-2 toxin level in corn from North America and East Europe could potentially impose medium risk to piglets, breeding pigs, poultry breeders and layers.

Adisseo has established a comprehensive mycotoxin risk management program, to cover above risk level estimations, it is recommended to supplement a more powerful broad-spectrum mycotoxin deactivator (e.g. Unike plus) to diets for breeding and long living animals. With multiple mode of actions beyond adsorption, Unike plus is also able to deactivate mycotoxins, improve immunity, reduce oxidative stress and provide support to essential gut and organ functions. For non-breeding animals, at presence of >3 types of mycotoxins with medium-high level, adequate protection by Toxy-Nil Plus is also encouraged.

Eliminating *Salmonella* in feed and drinking water

Salmonella control is a complexity, several measures should be taken, including both physical and chemical methods, to prevent or eliminate its contamination and proliferation. Physical methods include irradiation and thermal treatment such

In addition, even low levels of mycotoxins (trichothecenes, aflatoxins) could negatively impact

management program, to cover from raw material procurement until animal consumption (Figure 2). With

and thermal treatment such as pelleting. Although thermal treatment is effective in killing

Salmonella, it is only a point-in-time strategy and does not eliminate the possibility of post-processing contamination.

The inclusion of chemical additives, like organic acids, either alone or in combination with other mitigation techniques, helps to decrease the risk of re-contamination. The efficacy of acids depends on numerous factors such as feed composition, moisture level, physical form, the composition and inclusion level of the acid blend and the chemical form of the active ingredients (e.g. pure acids or salts of acids). A novel development is to use a blend of essential oil components or medium chain fatty acids (MCFA) to work synergistically with organic acids.

Adisseo offers a complete range of *Salmonella* inhibitor products including powder and liquid formulations to control and eliminate *Salmonella* in feed raw materials and finished feed. In particular, Salmo-Nil liquid utilizes a synergistic blend of buffered formic and propionic acid combined with lactic acid that can effectively reduce *Salmonella* and other pathogen contamination in feedstuffs by slowing down their proliferation or by killing the pathogen. In addition, in the Salmo-Nil Pro liquid version, we combine organic acids with essential oil components and MCFA, to ensure effective inhibition of *Salmonella* at a much faster pace.

To treat unclean drinking water, Adisseo developed Evacide S Liquid, a unique combination of four effective organic acids to acidify the drinking water, thereby further reducing the risk for contamination at the farm level. This results in lowering the incidence of gut challenges brought by unclean water.

Conclusion

In conclusion, the gut is a complex and dynamic ecosystem in which feed, microbiota and gut mucosa interact among each other. In this article we have discussed several feed quality parameters that influence gut integrity and function, including feed and water hygiene, mycotoxins and rancid fats in the feeds. As risks occur throughout the production process, it is difficult to clean up the contaminants in feed and water and to maintain their quality till animal consumption. Adisseo has supportive products such as antioxidants, mold and *Salmonella* inhibitors as the best-suited solution for feed and water hygiene and feed quality preservation. AF

Dr. Kevin Liu, (kevin.liu@adisseo.com) is Vice President Technical Services & Business Development, and Dr. Edwin Chow is Global Scientific & Technical Manager – Feed Preservation, both are with Adisseo Singapore. Dr. Olga Averkieva is Global Category Manager – Mycotoxin Management at Adisseo Belgium.
References are available on request to the lead author.

Step 2 of Adisseo's holistic gut health program - improving feed digestibility to minimise microbial proliferation in the gut will be featured in Asian Feed Magazine, April/May 2021.

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FEATURED ARTICLE

Mavin levels up 'made-in-Vietnam' tilapia

Mavin has been able to crack the code for commercial tilapia farming, making it Vietnam's first integrator, Dr Ngo Phy Thoa tells HA THU.

Livestock producers to see thin margins as feed prices shoot up

If you are a livestock producer, your bottom line just got thinner and chances are it is going to be slim going into the New Year.

Predicting the nutritional variability of corn

LIHONG ZHANG and KEVIN LIU* report an analysis of corn from various geographic origins. The study highlights that routine quality check on moisture and crude protein cannot differentiate the nutritional value of corn, but digestible amino acids and metabolizable energy can.

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A selection of news from industry suppliers on their launches, appointments, and other initiatives in Asia.

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Asia projects a viable future for insect protein

Nathan Preteseille an Independent consultant and Co-founder of Asean Food and Feed Insect Association addresses the future of insect meal in livestock feed production. In this podcast he offers insights into why more attention should be directed to this sector as it is a cost effective and sustainable alternative to plant based proteins and fish meal.

ASIAN FEED CALENDAR OF EVENTS

FEBRUARY

25 **Living with African Swine Fever**
(online)
Contact Sutasinee Lake
Ph +668 9898 0777
Email events@asian-agribiz.com
Web www.asian-agribiz.com

MARCH

4, 11 & 18 **Living with African Swine Fever**
(online)
Contact Sutasinee Lake
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Email events@asian-agribiz.com
Web www.asian-agribiz.com

18-21 **International Indonesia Seafood & Meat Expo**
JIExpo Jakarta
Contact PT Pelita Promo Internusa
Ph +6221 5366 0804

SEPTEMBER

14-17 **SPACE**
Rennes, France
Contact Cécile Berthier
Ph +33 (0)2 23 48 28 79
Email c.berthier@space.fr
Web www.space.fr

22-24 **VIV Asia**
Impact - Bangkok, Thailand
Contact Ms Panadda Kongma
Ph + 662 6700900 Ext 204
Email panadda@vnuexhibitionsap.com
Web www.vivasia.nl

OCTOBER

6-8 **Pet Fair SE Asia**
Bitec Bangkok, Thailand
Web www.petfair-sea.com

Email info@iism-expo.com
Web www.iism-expo.com

JUNE

9-11 **Recent Advances in Animal Nutrition – Australia Conference**
Crowne Plaza, Gold Coast, QLD, Australia
Email raan@yrd.com.au
Web https://www.raan.com.au/

23-25 **Indo Livestock 2021 Expo & Forum**
JCC Jakarta, Indonesia
Contact PT Napindo Media Ashatama
Ph +6221 8650962, 8644756, 8644785
Email info@indolivestock.com
Web www.indolivestock.com

JULY

21-23 **Ildex Vietnam**
SECC, Ho Chi Minh City
Contact Panadda Kongma
Ph +662 670 0900 ext 204
Email panadda@vnuexhibitionsap.com
Web www.ildex-vietnam.com

AUGUST

8-12 **World Poultry Congress (WPC)**
Palais des Congrès, Paris, France
Web www.wpcparis2020.com

24-26 **Livestock Malaysia 2021**
Melaka International Trade Center (MITC), Malacca, Malaysia
Contact Rita Lau
Ph +603 2176 8788
Email rita.lau@ubm.com
Web www.livestockasia.com

OCTOBER

13-15 **Vietstock 2021 Expo and Forum**
SECC Ho Chi Minh City, Vietnam
Contact Sophie, SES Vietnam Exhibition Services
Ph +84 28 3622 2588
Email thao.nguyen@informa.com
Web www.vietstock.org

13-16 **International Indonesia Seafood & Meat Expo**
JIExpo Jakarta
Contact PT Pelita Promo Internusa
Ph +6221 5366 0804
Email info@iism-expo.com
Web www.iism-expo.com

NOVEMBER

11-13 **Livestock Philippines & Aquaculture Philippines 2021 (hybrid)**
World Trade Centre, Manila, Philippines
Contact Michael Blancas
Ph +63 2 551 7718 / 551 7564
Email michael.blancas@ubm.com
Web www.livestockphilippines.com

24-26 **Ildex Indonesia**
Indonesia Convention Exhibition (ICE) BSD, Tangerang
Web www.ildex-indonesia.com

24-26 **Poultry India 2021**
Hyderabad, India
Contact Mrs Sandhya Rani
Ph +91-7997994331/4/5/6/7
Email info@poultryindia.co.in / poultryindia@gmail.com
Web www.poultryindia.co.in

DECEMBER

1-3 **AGRILivestock 2021**
Myanmar Expo Hall
Contact Ms Thu Thu
Email thuthu@ambtarsus.com
Ph +95 9 428200424
Web www.agrilivestock.net

JANUARY 2022

18-20 **Victam, Animal Health & Nutrition Asia**
Bitec Bangkok, Thailand
Contact Patricia Heimgartner
Ph +31 33 246 4404
Email expo@victam.com
Web victamasia.com

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