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July/August 2023

African Farming and Food Processing

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Seeding the success for oil palm

Poultry
Strategies to control poultry red mite infestations

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AI paves the way for smart sorting and grading systems

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African Farming and Food Processing

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Farming Calendar 2023

SEPTEMBER

12-14	SPACE 2023 *https://uk.space.fr/*	RENNES
15-17	TANZFOOD *https://www.tanzfood.com/*	ARUSHA
22-23	Naivasha Horticultural Fair *https://www.naivashahortifair.com/*	NAIVASHA

OCTOBER

17-19	agrofood West Africa *https://www.agrofood-westafrica.com/*	ABIDJAN

NOVEMBER

12-18	AGRITECHNICA *https://www.agritechnica.com/en/*	HANOVER
13-15	African Agri Investment Indaba *https://www.agri-indaba.com/*	CAPE TOWN
20-22	VIV MEA *https://www.vivmea.nl/*	ABU DHABI
20-22	Horti Agri Next MEA *https://hortiagrimea.com/*	ABU DHABI
21-23	agrofood Ghana *https://www.agrofood-ghana.com/*	ACCRA

DECEMBER

12-14	Food Africa *https://foodafrica-expo.com/*	CAIRO

Readers should verify dates and location with sponsoring organisations, as this information is sometimes subject to change.

Arla Foods inaugurates Nigerian dairy farm

AS PART OF its efforts to ensure sustainable milk production in Nigeria, Arla Foods has inaugurated a state-of-the-art dairy farm located in Damau village, Kaduna.

Speaking at the inauguration ceremony, Executive Governor of Kaduna State, Mallam Nasir El-Rufai described the newly commissioned dairy farm as a significant milestone and game-changer for the dairy sector in Nigeria. He commended the management of Arla Foods for having faith and confidence in Nigeria and the Kaduna state government.

The Arla Farm is the first of its kind in Nigeria. Designed to ensure optimum animal welfare and productivity, the farm will be a showcase for sustainable milk production in the country.

The farm covers 400 ha of land, with the capacity to house 400 milking cows and 1,000 animals in total. Currently, it is home to 216 Danish Holstein cows, which arrived in May 2023, and are settling well into their new environment.

In his welcome address, the executive vice president of Arla Foods International, Simon Stevens, described the completion of the farm as a massive achievement for Arla Foods in its journey in Nigeria and globally, noting that this success exemplifies the significance of solid partnership and the vast potential available in Nigeria. He disclosed that the project was conceived in line with the quest to achieve a number of United Nations' Sustainable Development Goals, including 2, 8, 12 and 17.

Stevens added that the farm, delivered at an investment cost of more than US$10.7mn, would serve as a place of milk production and an epicentre of dairy farming knowledge.

Anna MÍnsson, head of Arla Foods West Africa noted that more than 40 people would be directly employed at the farm, as this would serve as a means of livelihood to Nigerians, especially those within the Damau community of Kaduna state. She explained that the farm is expected to produce 1.6mn kg of milk in 2024, with an annual production target of 4mn kg of milk.

Agrofood offers opportunity to build West African business

FOLLOWING A LONG break after the pandemic, Agrofood West Africa 2023 is returning to Abidjan, Côte d'Ivoire, from 17-19 October to cover the entire value chain 'from food to fork'.

The show will be held in conjunction with plastprintpack West Africa at the Abidjan Exhibition Centre and will build on the success of the last event which was held in 2018. The last edition welcomed more than 1,461 visitors, 80 exhibitors from 17 countries and more than 50 speakers from around the globe. Hopes are high that it will attract numbers this year who will enjoy the event as much as the last – 100% of 2018 visitors recommended the event in the future, according to the organisers.

Across the extensive exhibition floor, attendees will be able to find a range of providers offering their services and technology in relation to key agrofood topics. These include agricultural machines, harvesting equipment, analytical equipment, dryers, cleaners, storage systems, feeding equipment, grain systems, greenhouse equipment, milling and mixing installations, pesticides, fertilisers, processing equipment, seeds, and much more.

Visitors will also benefit from a three-day conference held in parallel with the exhibition and will feature a variety of seminars, symposiums, panel discussions, and presentations. Highlights of the 2018 conference included the official launch of HortiFresh Fruit and Vegetable Programme for Côte d'Ivoire; panel discussions and expert sessions in the HOLLAND LOUNGE; a Bosch seminar on processing and packaging of local high-added value products for the food and confectionary industries; and a VDMA symposium on how European plastic and rubber machines can make a valuable contribution to the West African plastic, packaging and recycling industries.

Image Credit: Agrofood West Africa

Agrofood West Africa will take place in conjunction with plastprintpack West Africa.

With a steady increase in the import of food and beverage technology into West Africa (an annual increase of 5.8% was recorded between 2015 and 2021) and a growing population that needs to be fed, the market dynamics are perfect for agrofood industry to thrive in the region. Agrofood 2023 will help to serve this and ensure businesses are well equipped and connected to make the most of this opportunity.

Find out more about the event at:
https://www.agrofood-westafrica.com/

20th edition of Naivasha Horticultural Fair to kick off in September this year

NAIVASHA HORTICULTURAL FAIR is known to be the largest horticultural fair in Africa and has consistently grown over the years. This year, the event will be held from 22-23 September 2023 at the Naivasha Sports Club in Naivasha, Kenya.

Being in its 20th year, the event attracts an audience from across the continent and Europe, showcasing products and services from stakeholders in the horticultural industry, primarily the flower industry but also car manufacturers, accessories, financial institutions and more.

The event is the largest horticultural fair in Africa and has consistently grown over the years.

Image Credit: Naivasha Horticultural Fair

The grounds of the fair, which will take place in an outdoor setting will boast a wide range of exhibitors, ranging from startups to some of the biggest corporates in Africa and beyond. During the event, exhibitors get the unique opportunity to differentiate their brand from the competition and create a lasting impression on current and potential customers. The fair also assists visitors with finding new clients and business prospects, networking with colleagues, shopping for cutting-edge goods and services, and gaining priceless market insights.

Corporate image is everything, especially in industries that depend on trust and quality. Exhibiting at Naivasha Horticultural Fair is therefore a wonderful way for exhibitors to highlight their company as being serious, reliable, and large enough to afford its presence at leading events and conferences.

Moreover, as the fair slowly moves towards the agricultural sector, it continues to be an important part of the horticultural year by enhancing the small and medium farmers in this sector. Agriculture is undoubtedly an important sector to the Kenyan people and economy. Also, on the business side, there are more than 100,000 small-scale farmers, which means a lot of business has to be got.

Preparations for the fair are currently in full swing, and the organisers of the event continue to ensure that it is entirely a businessman's fair.

For more information, visit: https://www.naivashahortifair.com/

Stalosan F revealed to be capable of killing ASF and FMD viruses

A NEW EFFICACY test from Vietnam, distributed by San Group, reveals a piece of break-through information about the Stalosan F efficacy against a variety of disease-causing microorganisms, including the Foot and mouth disease (FMD) and African swine fever (ASF) viruses.

FMD, which affects cattle, buffaloes, pigs, sheep, goats, and around 70 wildlife species, is estimated to circulate in 77% of the global livestock population in Africa, the Middle East and Asia, as well as in a limited area of South America. Although FMD is a disease of low mortality, the global impact is colossal due to the huge numbers of animals affected. It spreads quickly and causes significant economic losses, due to reduced production and losses caused by costs of FMD control and limited access to markets. The annual global economic impact of FMD has recently been estimated at US$11bn in endemic areas and an additional minimum of US$1.5bn was ascribed to virus incursions into FMD-free countries.

Another important pathogen, responsible for massive losses in pig populations and drastic economic consequences, ASF has become a major crisis for the pork industry in recent years. With no effective vaccine, the disease is not only impeding animal health and welfare but has also detrimental impacts on biodiversity and the livelihoods of farmers.

In total, since January 2020, ASF has been reported as present in five different world regions in 39 countries, affecting more than 1,125,000 pigs and 36,000 wild boars, resulting in around 1,960,000 animal losses.

Against this background, the Stalosan F efficacy test against bacteria and HPAI v, FMD and ASF, made by the National Centre of Veterinary Diagnostics in Vietnam, has added significant value to the broad-spectrum efficacy against a variety of pathogens, showing that it has a completely inactivating effect on the types of bacteria Escherichia coli, Salmonella sp., Staphylococcus sp. and Streptococcus sp. as well as the disease-causing viruses FMD, Blue Ear (PRRSV), ASF and the highly virulent avian influenza (HPAIV H5N1). It also shows that the effect of Stalosan F antiseptic can last for at least seven days.

Image Credit: Adobe Stock

FMD affects cattle, pigs, sheep, goats and other cloven-hoofed ruminants.

Having in hand a powerful tool such as Stalosan F, capable of killing ASF and FMD viruses, can make the difference in the global fight for sustainable animal production, if applied as a part of strict biosecurity procedures.

Eritrean Ministry of Agriculture announces production of two animal disease vaccines

THE ERITREAN MINISTRY of Agriculture has announced that it has produced two internationally certified animal disease vaccines through the National Animal and Plant Health Laboratory based in Villagio, Asmara.

According to Efrem Gebremeskel, director of the National Laboratory, the two vaccines produced are PPR–against small ruminant disease and Newcastle–an important poultry disease. Gebremeskel explained that the two vaccines were selected for production since they could address two very important diseases which otherwise had to be imported at a much higher cost.

He further outlined the importance of these two vaccines in terms of self-reliance, saving hard currency, shortening the procurement process during outbreaks of diseases, and also strengthening the country's production capacity with young experts taking centre stage.

Regarding the quality of the vaccines, Gebremeskel indicated that standard quality control measures were conducted at the national level through the National Animal and Plant Health Laboratory Quality Control, and the Ministry's Regulatory Services as well as internationally by the African Union Pan African Veterinary Vaccine Centre, an international quality control institute delegated by the Food and Agricultural Organisation (FAO) and World Animal Health Organisation.

Gebremeskel also commended the all-round support the National Animal and Plant Health Laboratory provided by the relevant Government institutions and partners, while further noting that the National Animal and Plant Health Laboratory had planned to produce two more vaccines for infectious bronchitis and sheep and goat pox. Moreover, he commended the all-round support the National Animal and Plant Health Laboratory was provided by the relevant government institutions and partners. The laboratory was established in 1903 and used to produce vaccines until 1972.

Image Credit: Adobe Stock

The vaccines include one against an important poultry disease.

After Independence, the Government of Eritrea in cooperation with partners made a concerted effort to renovate the laboratory, which has led to this success story.

Novus International puts the focus on intelligent nutrition

NOVUS INTERNATIONAL INC, the global feed additive company, hosted a press conference during the World Pork Expo in Iowa to reveal its comprehensive rebranding initiative. The changes reflect the 32-year-old company's promise to deliver more to its customers and its commitment to providing solutions created through advanced technology, based on global scientific research that goes further to offer unexpected benefits to customers.

"Intelligent nutrition is how we support animal health and performance," said NOVUS SVP and chief commercial officer Ed Galo from the Iowa State Fairgrounds.

"Our novel combination of experienced people, insightful perspective, and smarter solutions allows us to put more into everything we create, because we want to deliver more benefits that deliver more for producers. That is intelligent nutrition."

The company has refocused its attention on where it can best support its customers by addressing challenges and opportunities in production. The NOVUS product portfolio includes solutions to those challenges in the form of amino acids, organic bis-chelated trace minerals, organic acids, enzymes, and essential oils. NOVUS also leads the way in embedding functional ingredients in grain through INTERIUS technology.

"We have experienced significant growth since 1991," Galo said. "In the last few years, we have honed in on what we can uniquely provide to poultry and livestock producers, nutritionists, feed mills, and distributors around the world – solutions offering something extra. Services and solutions that are made of more."

'Made of More', the company's new slogan, represents the focus of all its future endeavors.

"Just as producers are asked to do more with their poultry and livestock – more growth, more efficiency, more yield – our experience and our solutions offer more to help them reach their production goals," said Abishek Shingote, NOVUS associate VP of Global Strategic Marketing – Technology & Innovation.

NOVUS liquid and dry methionine solutions utilise the HMTBa molecule, which is a precursor to L-methionine. Because of this unique molecule, ALIMET feed supplement, MHA feed supplement and MFP feed supplement are nitrogen-free and have properties of an organic acid benefiting overall gut health. Liquid ALIMET feed supplement requires virtually no handling thanks to the company's automated inventory system for customers (AIMS). HMTBa is also the backbone for MINTREX bis-chelated trace minerals, highly bioavailable and absorbable organic zinc, copper, and manganese that allow producers to use lower inclusion of minerals in the ration while seeing the same or improved performance and growth. MINTREX is also a source of methionine through HMTBa. ACTIVATE nutritional feed acid is made from a blend of organic acids and HMTBa shown to reduce the survivability of certain pathogens in feed. "These products provide more than what customers have come to expect from traditional organic trace minerals or organic acid solutions," said Shingote. Just as NOVUS works to do more for its customers, it's also working to offer more to the industry.

Image Credit: Adobe Stock

NOVUS liquid and dry methionine solutions utilise the HMTBa molecule, which is a precursor to L-methionine.

Galo said new products – created in-house, through partnerships, or via mergers and acquisitions – are on the horizon. "Innovation remains our core priority. As experts in the global food system, we can see where the animal protein industry is heading and this vision directs how we can help meet regional goals from performance and environmental sustainability to return on investment," he said. "We are driven to create new ideas and technologies that improve the health of animals and animal protein production.

Skretting introduces new feed for shrimp farms

SKRETTING HAS INTRODUCED Elevia, a new, innovative feed engineered to offer superior nutrition and water quality in shrimp hatcheries and nurseries. The precisely produced, stable micro diet improves larval performance while simplifying feed management and ensuring a cleaner system.

Formulated to mimic the natural feeding approach of shrimp larvae, Elevia is a next generation solution that surpasses conventional feeding methods and traditional aquafeed ingredients, setting a new standard for hatchery performance. Incorporating new sustainable raw materials such as essential long-chain omega-3 fatty acids, algae-derived DHA and hydrolysed marine proteins, it enables shrimp to develop into strong and healthy post larvae with increased capacity to thrive in nursery environments.

"Elevia reduces the production cycles in hatcheries and provides shrimp with the necessary energetic reserve to improve resilience for transportation to the farm and acclimatation," said Marita Montserrate, technical director at Skretting Ecuador. "In addition, Elevia ensures better performance in nursery, reduces the cost of the post larvae and promotes increased survival and growth throughout the entire production cycle."

Elevia improves the ability of shrimp to handle challenges by providing them with nutrients that improve their immune system and overall resilience. This enables the shrimp to cope more effectively with stressful environmental changes. As a result, shrimp production becomes more reliable and successful, reducing the risks associated with variations in water conditions and other factors.

Through Elevia's advanced formulation, physical properties and colour, the need for multiple diets and flakes is significantly reduced, resulting in simplified operations and feed management. Another key feature that contributes to streamlining operations is the diet's ability to maintain water stability. Thanks to its unique composition and encapsulation of omega-3 fatty acids, the leaching of lipids into the production system is prevented, ensuring cleaner and uncompromised water quality. Consequently, intact feed particles remain stable for extended periods, minimising the necessity for frequent replacements. This not only promotes optimal water conditions but also facilitates essential system maintenance, all while alleviating the strain on bio- and mechanical-filters.

"We are very excited about introducing Elevia to the shrimp hatcheries, particularly in Ecuador as our first launch country. We are confident that once again Skretting is paving the way for a new generation of shrimp hatchery production and facilitating improved post larvae quality," said Eamonn O'Brien, global product manager LifeStart at Skretting.

Elevia is produced in Skretting's state-of-the-art LifeStart facility in France, and is currently available in Ecuador, with other markets to follow.

Skretting is a global leader in providing innovative and sustainable nutritional solutions and services for the aquaculture industry. With production facilities in 18 countries on five continents, it manufactures and delivers high quality feeds from hatching to harvest for more than 60 species. The total annual production volume of feed is more than 3mn tonnes.

Skretting is the aquaculture business line of Nutreco, a world leader in animal nutrition. Skretting's global operations are based in Stavanger, Norway. It has 3,800 employees worldwide.

Zimbabwe starts developing 2.0 One Health AMR National Action Plan

ZIMBABWE WAS ONE of the first African countries to put in place its NAP with the objective of reducing the drug resistance index standing at 66.6% against a benchmark of 25%.

The Government of Zimbabwe has commenced updating its antimicrobial resistance (AMR) National Action Plan (NAP) 2023-2027, to replace the previous NAP (2017-2021) which had lapsed.

The review provides an opportunity to assess the impact of activities carried out during the last five years and assist with developing evidence-based policies and decisions and evaluate procedures and indicators that could be adopted to achieve strategic objectives within the new plan. Updating NAP will help determine the necessary interventions to address AMR, leaning on a comprehensive 'One Health' approach and promoting cooperation and coordination between sectors at the national level.

The use of NAPs, which have well-defined goals, strategies, and policies as well as frameworks, is essential in the fight against AMR. During the implementation of Zimbabwe's old NAP, a number of achievements were noted. Zimbabwe was also one of the first African countries to put in place its NAP with the objective of reducing the drug resistance index standing at 66.6% against a benchmark of 25%. The World Health Organisation (WHO) is currently coordinating the creation of a One Health Dashboard by integrating laboratory information systems from all the One Health sectors in Zimbabwe to enable real-time sharing of data.

The United Nations, through FAO and WHO continues to support the Government of Zimbabwe to reducing the drug resistance index and strengthening the One Health Initiative. The following areas are being supported: implementing action of national plans, developing guidance, advice and tools, and gathering data and evidence to shape policies and drive action.

"The momentum is now there, and it is important for the Government of Zimbabwe to keep building on these achievements to deal with AMR," said Stanley Midzi, WHO Zimbabwe Health Systems Strengthening technical officer.

Image Credit: Adobe Stock

Zimbabwe was one of the first African countries to put in place its NAP with the objective of reducing the drug resistance index.

The United Nations, through FAO and WHO continues to support the Government of Zimbabwe to reducing the drug resistance index and strengthening the ONE Health Initiative. The following areas are being supported; implement action of national plans, developing guidance, advice and tools and gathering data and evidence to shape policies and drive action.

Trouw Nutrition launches MyMilkPrint to calculate impact of milk on the environment

TROUW NUTRITION HAS launched MyMilkPrint, a service which allows feed advisors to calculate the environmental impact of milk at the farm level, enabling them to develop effective emission reduction strategies for dairy producers.

To remain competitive in an increasingly sustainability-oriented marketplace, dairy producers are being challenged to measure and reduce the environmental impact of their products. Early adopters of more sustainable practices are already benefitting from a clear competitive advantage, making value-chain transparency a key selling point. Others are still exploring where to begin their 'sustainability journey' and what they can do on the farm level to make their milk production more sustainable. Feed advisors have a key role to play in this transition.

Providing in-depth insights

Trouw Nutrition is addressing the growing need for transparency around the sustainability of milk with the launch of MyMilkPrint, a one-stop online environmental footprint service for milk production. The new service, integrated into Trouw Nutrition's MyNutriOpt digital platform, uses farm-specific inputs such as milk production, on-farm energy use, and farm-grown ingredients, combined with data on purchased feeds and nutritional data. These inputs are then translated into an accurate estimate of the environmental impact per kg of farm-gate milk produced.

MyMilkPrint requires no specialist knowledge and minimal set-up and training. With just a few clicks, feed advisors can uncover emission hotspots, and identify effective strategies to reduce the environmental impact of their client's milk, without compromising on milk production or animal performance. For example, replacing a fat or protein source in a feed ration with an alternative ingredient that has a lower environmental footprint can lead to significant reductions in the total impact of the feed ration. This in turn, reduces the ecological impact of the milk produced.

For dairy producers, the insights and reports provided by MyMilkPrint can easily be shared, helping to develop more sustainable practices and forge closer ties with downstream business partners such as supermarkets, wholesalers, and food processors.

Image Credit: Adobe Stock

The service allows feed advisors to calculate the environmental impact of milk at the farm level.

African Farming speaks with Bühler Nigeria's managing director, Manuel Murrenhoff, regarding the company's efforts to support West Africa in achieving food security and rice self-sufficiency.

Exclusive interview with Manuel Murrenhoff, managing director at Bühler Nigeria

Bühler Nigeria's managing director Manuel Murrenhoff discusses the company's efforts to boost rice production in West Africa.

African Farming (AF): How is Bühler supporting the growth of rice production and processing in West Africa?
Manuel Murrenhoff (MM): Bühler is a Swiss technology partner for grain and food handling, storage, and processing, not only in West Africa but around the world. We have built more than 30 rice mills in the region and support our customers with a strong commercial and technical team with more than 60 employees based in Abidjan (Ivory Coast), Lagos and Kano (Nigeria) and Douala (Cameroon). This allows us to be close to our partners and support them in all stages of the project lifecycle: Project conceptualisation, financing, technical consultation, manufacturing, installation, commissioning, and after-sales services. Additionally, we place special emphasis on sustainability and support our partners to leverage circular economies. This could mean using rice husk to produce steam and electricity, turning rice brokens into rice semolina or flour, and producing fortified rice kernels or rice-based breakfast cereals and snacks.

AF: What type of equipment/solutions do you provide to these regions?
MM: Bühler is an end-to-end solution provider for paddy-to-white rice mills with a strong footprint in West Africa. This allows us to complement our high-quality equipment with fast and efficient on-site services such as installation and commissioning, process improvement audits, maintenance services and emergency support.

AF: What are some of your latest innovations in rice processing?
MM: Bühler has recently launched three innovations for the rice milling industry. First, we have the DRHK Top Husk Debuhler Husker, which stands out with automated roll change and increased capacity. Second, we have the Bühler Sortex, which can now be complemented with the Sortex Monitoring System (SMS). The SMS provides an overview of the key performance indicators of your Bühler SORTEX machine and delivers actionable insights to increase productivity, yield, and efficiency. Dashboards tailored towards different users need help to make informed decisions from anywhere. Third we have our flagship TopWhite Whitener BSPB. For this, we have introduced the diamond grinding wheel which lowers energy consumption by as much as 10% while increasing the grinding wheel's life cycle about five times.

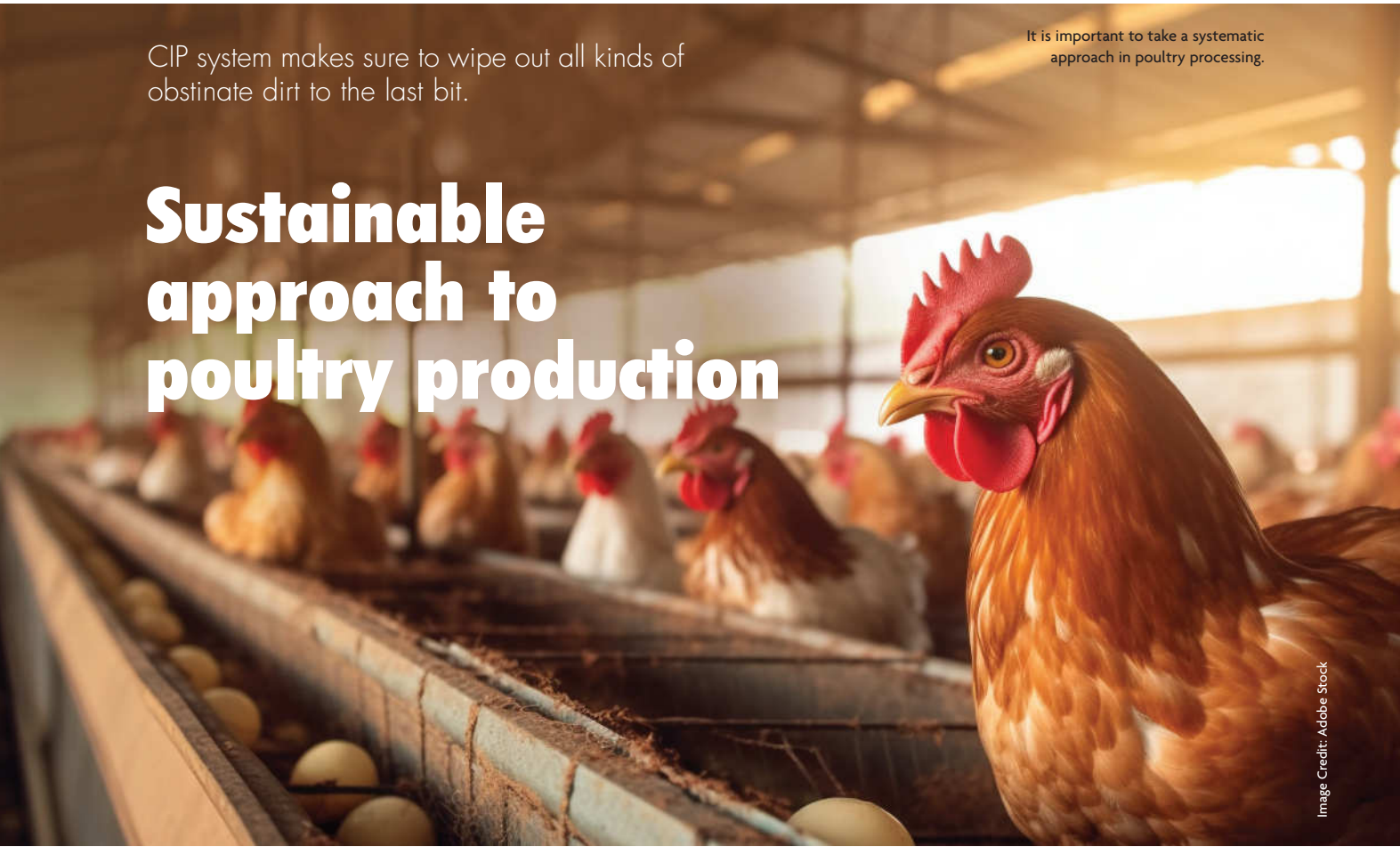
Bühler is an end-to-end solution provider for paddy-to-white rice mills with a strong footprint in West Africa.

AF: Besides Nigeria and other West African regions, which other parts of Africa do you actively provide your services to?
MM: With more than 700 employees in more than 20 offices and service stations in the Middle East and Africa region, Bühler remains near its customers to ensure fast and reliable services. These offerings are complemented by one manufacturing side in South Africa and two application and training centres: the African Milling School (AMS) in Nairobi, Kenya, and the Cocoa Competence Centre (CFIA) in Abidjan, Ivory Coast. Currently, we are building the Grain Processing Innovation Centre (GPIC) in Kano, Nigeria. Upon completion in Q4 2023, the GPIC will act as the Centre of Competence for local grain milling in Africa. We envision an ecosystem of collaboration to develop new processes, recipes, and products to add value to locally produced grains. We see locally produced and processed grains as the key to Africa's food security and invest in the technological infrastructure on the continent: In Africa. For Africa.

AF: What are Bühler's goals in helping Africa achieve rice self-sufficiency?
MM: Bühler's goal is to support Africa in achieving food security by leveraging the newest technology and innovation. Rice self-sufficiency is a crucial constituent in this. As the preferred technology supplier for the public and private sectors, we understand our biggest leverage in reducing wastage, water and energy consumption while increasing yield and final product quality. Every year, Bühler invests 5% of its turnover into innovation and R&D to allow customers to keep an edge in the market using the company's solutions. It is our conviction that we can support our partners best because we are close to them. This helps us understand their needs and challenges, while also allowing us to provide products and services that fit the needs of Africa.

CIP system makes sure to wipe out all kinds of obstinate dirt to the last bit.

Sustainable approach to poultry production



It is important to take a systematic approach in poultry processing.

Image Credit: Adobe Stock

POULTRY IS AN integral part of our daily consumption needs. In that context, it is important to be aware of what goes into the complex process of its production and how it works. The presence of spoilage and pathogenic microorganisms cannot be avoided throughout the process. To top that, cross-contamination is also inevitable. To tackle such challenges, it is important to analyse and take a systematic approach to combat the microbes involved. Ideal measures that should be taken into consideration include cleaning and disinfection procedures, or chemicals suitable to remove the type of dirt present in each area, to name a few.

Organic dirt is an important factor to consider in the maintenance of hygiene. Organic dirt types depend on which part of the slaughterhouse it belongs to. For instance, feathers and faeces are prevalent while the birds are unloaded, shackled, stunned, scalded and plucked.

Blood becomes the predominant source of contamination while killing, and there are special practices to remove them.

During the evisceration stage, fat, proteins and organic remains from the gut, along with microorganisms from the intestines needs handling. When hens are slaughtered, the removal of fatty residues can be a real challenge. Hooks from the chilling tunnel will be physically draining, not just for their large number, but because it is difficult to reach them.

Organic dirt is an important factor to consider in the maintenance of hygiene.

Ways to clean and disinfect poultry spaces

To fight food hazards that may rise from poultry, the fundamentals of a cleaning and disinfection procedure must have these following steps:

1. The largest particles can be dealt with effective water pressure and mopping. This will help in keeping the walls, equipment and floors look clean.
2. Cleaning detergents or detergent-disinfectants can work wonders on food establishments. These do an exceptional job in dislodging any obstinate dirt particles such as grease, and leave them in suspension or emulsify them. Detergents are dissolved in water and should be used at the correct recommended manufacturer concentration and proper temperature. They can be applied by spraying, immersion or using foam-spraying equipment, although some surfaces with thick layers of resistant dirt may require manually scrubbing with scouring pads or non-abrasive brushes.
3. Next, it is important to rinse to ensure that all leftover dirt or detergent is removed.
4. One must follow the recommended dosage and contact time while spraying disinfectant on the surfaces.
5. Finally, food contact surfaces require thorough rinsing.

Cleaning in place

One of the safe and easy ways to effectively clean poultry equipment is called Cleaning in place (CIP). CIP is comprised of chemicals, heat and water, allowing to flush unwanted particles and unsanitary substances from equipment without the need for disassembling. The main components that make up a CIP system are designs, cleaning agents and cycles.

The CIP system works in three kinds of set up – single pass, recirculating (multi-use), and re-use. Single pass is meant for one-time use and is best-suited for heavy loads. This is because the cleaning of heavy loads will require covering a huge amount of contaminants, leaving the medium unfit for reuse. Recirculating, on the other hand,

allows reusing and is best suited for light loads. The reusing method can be applied on future cleanings.

Once the design has been selected, it is time to choose the cleaning agent. These involve multiple options of chemicals that can be chosen in terms of respective needs. Caustic soda, phosphoic/nitric acids, and sodium hypochlorite are the usual cleaning agents.

CIP is driven by a series of cycles, whereby an initial drain run is required to flush out particles, pre-rinse (<80 degrees F) to get rid of loose soil, applying the chosen solution to remove soil or debris from equipment, post rinse to wipe clean the remaining dirt, and finally an optional sanitising step.

One of the safe and easy ways to effectively clean poultry equipment is cleaning in place.

Equipment that require CIP approach

Some of the key pieces of food processing equipment that should be cleaned-in-place are:

Cutting machines - When it comes to meat, proper cutting is what makes a lot of difference, for customers as well as retailers. While cutting the meat to get the desired quantity, cutters are bound to get stained from leftover pieces, which requires frequent cleaning.

CIP system is a cheap, simple and time-saving..

Image Credit: Adobe Stock

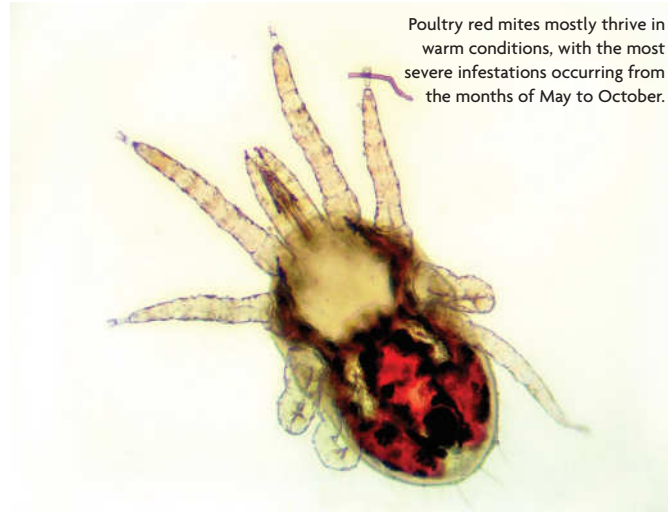
Conveyor systems - Conveyors define the food processing line; therefore, it is of utmost importance to keep conveyors and conveyor belts clean to avoid cross-contamination hazards. To minimise such risks, CIP systems can be integrated in a variety of ways.

Industrial packaging equipment - Let alone their indispensable position, these machines write the fate of a product as they comprise the final step ahead of distribution. In such critical situations, CIP is the most relevant approach to double check and avoid any possible instances for cross contamination.

CIP system is a cheap, simple and time-saving approach as they eliminate the complicated steps of dismantling and washing each piece of equipment individually. It is also a sustainable choice as it allows reusing the solutions, thus reducing cost as well as unnecessary waste. CIP systems also give maximum satisfaction as the strong chemicals used in cleaning makes sure to wipe out all kinds of standing dirt.

Using AI technology to monitor poultry houses helps detect red mites in their early stages of development, thereby enabling quick implementation of required treatment measures.

Knocking out red mite infestations from poultry houses



Poultry red mites mostly thrive in warm conditions, with the most severe infestations occurring from the months of May to October.

Image Credit: Adobe Stock

DERMANYSSUS GALLINAE, COMMONLY known as the poultry red mite (PRM) is a highly debilitating pest that affects both wild birds and farmed poultry. Depending on their numbers, these blood sucking ectoparasites that commonly affect laying hens, are capable of causing a wide variety of health issues. Low numbers of mites can cause irritation by making chickens restless, while large numbers can suck enough blood to cause anaemia, shown by a pale comb and wattles, weakness, dullness and reduced egg production. If the mites get out of hand, the birds can eventually die as a result of anaemia caused by excessive blood loss.

In addition to these devastating physical effects, red mites also serve as vectors for the Salmonella species, particularly the highly infectious Avian Influenza (AI).

Controlling red mite infestations

Poultry red mite infestations are generally hard to control as they can be easily transferred between flocks by crates, clothing and wild birds. Being night feeders further makes them hard to spot. They also have the ability to survive without a blood meal for up to eight months, with deutonymphs and adult mites being resistant to desiccation. This means that removing the host from the area will

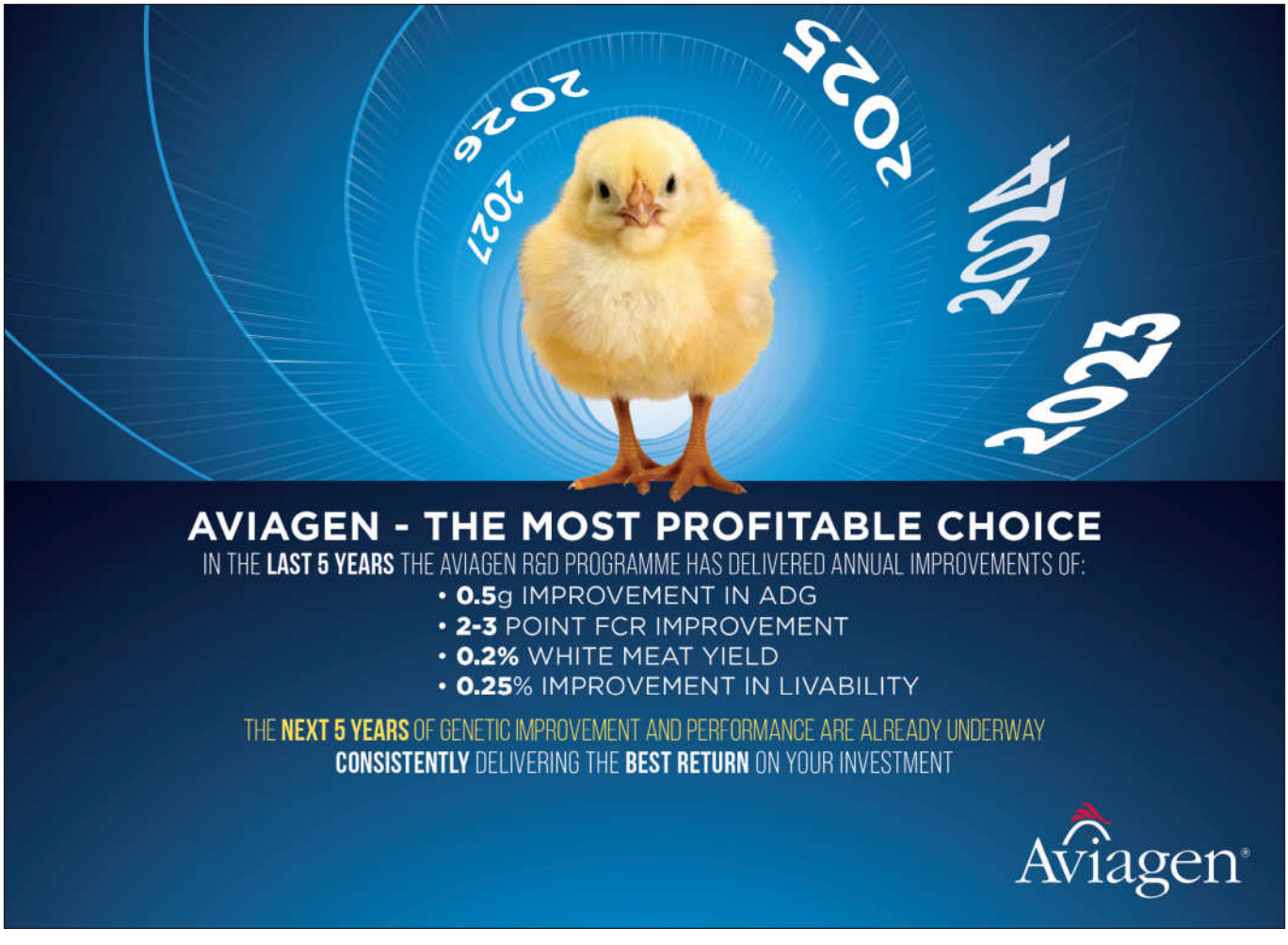


Image Credit: YieldX

The YieldX RedMite Sense solution enables early detection of red mites in layer poultry farming.

not be enough to eliminate the mites.

Chemical control methods involving sprays or pesticides are often used for red mite control. However, many chemical applications have a short residual activity, exert little or no effect on mite eggs and are prone to resistance development due to the selection of resistant mites that survive exposure to sublethal concentrations. In recent years, a number of alternative solutions including essential oils, predator mites, heat treatments, intermittent lighting programmes and inert dusts such as silica and diatomaceous earth have been used in poultry houses.

Advances in microbiology have also facilitated the development of effective vaccines, and the demand for natural products has led to the development of plant-derived compounds, natural enemies, growth regulators, and biopesticides as conventional pesticide alternatives. While these techniques have helped in significantly reducing red mite numbers, they have, however, failed to fully control their populations.

Early detection of poultry red mites can help save capital and boost farmers' profits, while also preventing the onset of other diseases that red mites are known to carry.

Products effective against PRMs

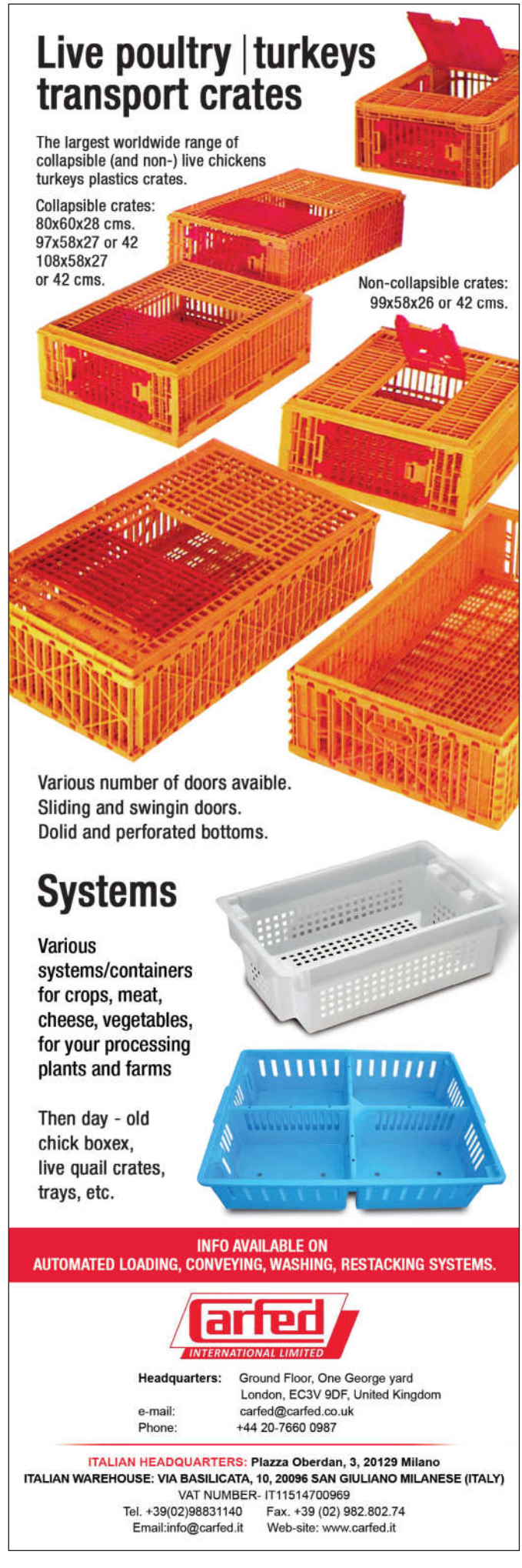
Since the treatment of poultry houses have failed to entirely eliminate poultry red mites, fluralaner-containing licensed products were tested by providing them to affected hens via drinking water. Fluralaner, being a potent inhibitor of the arthropod nervous system has proved to be effective in the destruction of mites biting the host hens.

A pilot study published in 2022 also confirmed the effectiveness of lithium chloride against poultry red mites in vitro. However, further research is required to find out whether there would be any effective method of administering lithium in situ, as well as in the assessment of potential residue problems that could likely affect poultry products.

This year, YieldX, an A/IoT-powered biosecurity data platform recently launched its new 'RedMite Sense' solution at VIV Asia 2023, the complete feed to food global trade show in Asia. The purpose of this product is to allow the AI-based early spotting of red mites in poultry farms through continuous detection, real-time alerts on the mite presence and the ability to share critical information with every third party.

Advantages of early detection

As in the case of YieldX's RedMite Sense, early detection of these pests can help save capital and boost farmers' profits. Moreover, red mites bring along with them a plethora of other diseases, which can be potentially prevented with early detection. In addition, using smart sensors, AI and machine learning alongside these new technologies can introduce new biosecurity practices in farms, thereby enhancing overall farm health and productivity. E



Deep diving into Zimbabwe's livestock sector, Wallace Mawire highlights the common challenges affecting beef production and the steady growth recorded by the sector since 2022.

Zimbabwe's beef production sector registers steady growth

ZIMBABWE'S BEEF CATTLE sector has been recording a steady increase in 2022, with the positive growth being attributed to a fairly good season for livestock and a reduction in mortalities, especially due to tick-borne increases.

Munyaradzi Chimowa, Acting Livestock Director in the Ministry of Lands, Agriculture, Fisheries, Water and Rural Development said that in the recent years, Theileriosis, popularly known as January disease, wreaked havoc on the national herd, resulting in increased herd mortality.

"Improved animal health management especially control of ticks and tick borne diseases, through an intensive dipping regime 5-5-4 dipping cycle helped reduce mortality due to tick borne diseases. Also, government intervention through the Blitz Tick Grease programme played a role in the fight against ticks. The national beef cattle herd currently stands at 5.64 million, a 2% increase from 5.5 million recorded in 2022," Chimowa said.

About 90% of the national herd is owned by farmers in the smallholder sector. Chimowa, however, says that off-take from the sector has remained relatively low, at about 9%. He highlighted that this was an increase from about 6% in 2020 and target off-take of 20%.

A total of 405,162 animals were slaughtered in the previous season, and about 80% of these slaughters were through the formal sector, while 20% of them were through the informal sector. At total of 68,654 metric tonnes of beef was produced in the 2022 season, with the average beef carcass weighing 175 kg in 2022, compared to about 154 kg in 2020.

"This is an indication of an increase in cattle size as well as cattle management practices that result in improved dressing out percentage. However, this is good progress, as we thrive to further improve the carcass weight to 220 kg. Improved carcass weight is a long term process that yields fruits with improved genetics and intensive cross breeding. The 220 kg carcass weight target will definitely be achieved though it will take time," Chimowa said.

Main productivity indicators that influence beef production in the country, both in the short and long term are the carcass yield, off-take, herd size and calving rate. According to Chimowa, the government and stakeholders are working towards addressing some of the challenges such as low production and productivity that affect the beef sector. Major causes of these have been identified as nutrition, animal health and genetics.

To address most of these challenges, the government is running various programmes including the presidential forage legumes programme aimed at addressing nutrition; the presidential silage scheme, also addressing nutrition; the blitz tick grease programme; and the fight against January disease, and addressing animal health.

Main productivity indicators that influence beef production in Zimbabwe, both in the short and long term are the carcass yield, off-take, herd size and calving rate.

About 90% of the national herd is owned by farmers in the smallholder sector.

Image Credit: Wallace Mawire

The artificial insemination programme was also spearheaded by the government to introduce new genes into the national herd so as to address the carcass sizes and other challenges associated with poor genetics.

Chimowa says that although the majority of the national herd at 90% is owned by smallholder farmers, the off-take as well as the quality of beef from the sector is usually low, comprising mainly of economy grade.

"This is partly due to the fact that the smallholder sector is characterised by the small livestock holding per household. Current livestock holding is estimated at three to five head of cattle per household. These are usually dual purpose cattle, often kept for milk, drought power, and manure. The animals are normally sold at the end of their productive life, hence, the low quality of the beef animals," Chimowa said.

According to a second round crop and livestock assessment report for 2021/2022 season produced by the responsible government ministry, the national beef herd increased from 5.47 million cattle in 2020 to 5.5 million in 2021.

The report also notes that the average national cattle mortality rate declined from 11.1% in 2020 to 8.86% in 2021, while the national average beef cattle off-take increased from 9% in 2020 to 10% in 2021.

Furthermore, the overall beef production from formal and informal slaughters increased by 30% from 50,000 metric tonnes in 2020 to 65,000 metric tonnes in 2021 against a national target of 90,000 metric tonnes in 2025. Also, the beef carcass weight increased from 154 kg in 2020 to 168 kg in 2021 against the targeted average of 220 kg. This is said to be a result of the semi-commercial beef cattle productions systems by farmers.

The NAGRC & DB has provided liquid nitrogen tanks and artificial insemination equipment to five districts in Uganda.

Image Credit: Adobe Stock

Ugandan farmers rejoice as the country adopts initiatives to beef up the import, production and export of exotic, disease resistant cattle breeds.

Initiatives to scale up Uganda's beef production and exports

WITH NEARLY 58% of Ugandan households being dependent on livestock for their livelihoods, cattle is found to be the most important livestock subsector in the country. However, beef production continues to lag behind local demand, and is expected to worsen further as the country's population is predicted to hit 100 million by 2050.

Analysis from the FAO's latest Monitoring and Analysing Food and Agricultural Policies (MAFAP) report highlights the need for more and different kinds of incentives and investments to help Uganda fully achieve its beef production and export potential. Valentina Pernechele, economist in FAO's Agrifood Economics Division (ESA) and one of the authors of the report, stated that improving transport links and logistical capacity by investing in meat processing plants and abattoirs would help bring large returns.

The report also identified that prevalence of livestock diseases such as foot-and-mouth disease was another major constraint. However, a number of activities including an annual vaccination programme developed and implemented by members of the national beef platform are already underway to contain transboundary disease outbreaks.

Uganda adopts FFS approach

Scientists at the National Livestock Resources Research Institute (NaLIRRI) and their partners have adopted a Farmer Field School (FFS) approach to improve feed resources for beef cattle in Uganda. A total of about 27 FFS were established across nine districts, each of them effectively participating in a pasture establishment and management cycle, pasture seed production and mechanised hay baling.

NAGRC & DB hand out artificial insemination equipment

As part of its efforts to boost dairy and beef production in Uganda, the National Animal Genetic Resources Centre and Data Bank (NAGRC & DB) has recently provided liquid nitrogen tanks and artificial insemination equipment to Luweero, Gulu, Mbarara, Fort Portal and Njeru districts.

Moreover, regional artificial insemination centres have been set up by the government, thanks to the African Development Bank's AVCDP project. These centres have necessary facilities for the storage and preservation of extracted semen, which helps farmers save time and cost of transportation.

Some farmers have also began practicing crossbreeding, in order to combine the genetic advantages of exotic and local animals.

Germination of oil palm seeds is no easy business. Dr. Terry Mabbett sheds light on the two vital steps required for the production of germinated seeds for planting.

Seeding the success for oil palm

Image Credit: Omex

The oil palm nursery.

OIL PALM PLANTATIONS around the world have their roots in the humid lowland tropics of Africa and where the African oil palm (Elais guineensis) originates. It was first carried and spread by man from Senegal to Angola in a broad swathe along the coast and into the interior along the path of the Congo River.

Oil palm readily grows, multiplies and spreads itself in forest clearings and shifting cultivation will typically create large areas of semi-wild oil palm groves. Like most tropical tree crops, including rubber and cocoa, oil palm was originally exploited by 'gatherer' communities, who picked nuts from wild and semi-wild palms. In the nineteenth century, enterprising communities began to cultivate oil palm by planting seeds with regular trade in palm oil and kernels between West Africa and Europe, starting at this time.

Subsequent development of plant breeding technology has produced high fruit and oil yielding hybrids that underpin today's large production and processing industries in Africa. Basically, there are three biotypes within the species E. guineensis distinguished by the structure of the pulp and shell. This in turn will determine palm fruit quality and its economic importance.

The tenera biotype which combines a thin shell and a high proportion of pulp is most commonly grown on oil palm plantations.

The three main types of oil palm within the species are:

1. The dura type which possesses a thick shell, of 2-8 mm thickness and a relatively small pulp comprising some 35-70% of the nut.
2. The pisifera biotype which lacks a shell.
3. Tenera, a natural hybrid of dura x pisifera with a thin shell (0.5-4.0 mm thickness) and an extremely high proportion of pulp that exceeds 90%. Tenera is further classified based on colour of the fruit as: a) nigrescens with violet to black unripe fruits, and ripe fruits with a brown or black cap, b) virescens having green unripe fruits ripening to reddish orange, and c) albescens without the reddish colour, because it lacks carotenoid pigments.

The tenera type usefully combines a thin shell (easy to crack during processing), and a high proportion of pulp. It is the biotype usually grown on commercial oil palm plantations, and dominated by the nigrescens fruit type as a series of commercial hybrids developed for high oil content.

However, along with plant breeding and the use of sophisticated hybrids, come restrictions and responsibilities related to the selection and germination of seeds. It is pointless for producers to 'save their own seed,' for these will just produce a mixture of sterile piserfa, dura and tenera palms, offering poor performance when compared with the improved plant material of the previous (parental) generation.

What's more, seeds of the oil palm are slow to germinate with a low germination success rate and a lengthy pre-germination period. Germination of oil palm seeds is no easy business and requires heat treatment so that germination is synchronised and the seeds 'all' produce healthy first shoots (plumules) and first roots (radicles) at the same time. It is not a procedure for the small grower, but one that is best done by a central authority or large plantation which then sells the germinated seeds ready for planting to other growers.

There are two vital steps required for the production of germinated seeds for planting, both of which are best carried out using a procedure called 'dry heat treatment' with seeds in polythene bags. They are:

1. Breaking of dormancy
2. Germination induction

The Germinator

Dormancy break and germination induction are carried out in the same custom-designed 'building' called a 'germinator,' at specific temperatures and seed moisture levels and for varying lengths of time. A typical germinator comprises a separate and enclosed heated space for breaking dormancy and an associated 'cool' area where seeds are placed for germination, all within a custom-designed building.

The isolated, heated area is an enclosed chamber, equipped with double glazed windows, double walls with 13 cm space, and a double layered ceiling, all designed to insulate the structure and maintain the intensity and consistency of heat required. Inside are 61 cm wide slatted shelves, 35 cm apart, sufficient to support 10-12 plastic bags per metre length of shelf. Each bag will contain some 1,000-1,500 seeds. The building is heated using conduction and convection through hot water pipes or electric heaters and is always thermostatically controlled.

Germination of oil palm seeds requires heat treatment so that germination is synchronised, and all seeds produce healthy radicles and plumules at the same time.

Breaking of dormancy

On arrival at the germinator, seeds are given identification codes to distinguish between hybrids or seeds obtained from an individual cross. They are then held in darkness at 'room' temperature in an air-conditioned room until required for heat treatment. At this stage, seeds have a moisture content of about 10% weight/weight, and require daily soaking for seven days along with a complete renewal of water. Soaking and several hours of drying under shade restores the seeds to the higher moisture level required for breaking of dormancy using dry heat treatment.

Seeds are loaded into plastic bags of 0.2 mm thickness to give 1,000-1,500 seeds per bag. Each bag is meticulously 'sealed' by closing the end with a series of sequential folds, and finally securing it with heavy-duty adhesive tape. Bags are loaded onto the shelves and treated to a consistent temperature of 39 C for 60-80 days (depending on the type of seed). Alternatively, growers can conveniently use self-made plastic bags from a 69 cm wide 500-gauge flat tube. This is cut into 60 cm lengths with one cut edge sealed to make a bag. These bags are then filled with seeds and the open end is secured with a strong elastic band.

Germination Induction

At the end of the 80-day heat treatment period, seeds are re-soaked for five days, with daily change of water. Seeds are then

Image Credit: Omex

Oil palms at various stages of growth and development.

dried under the shade for several hours until they transform from a shiny black to a dull dark colour. This surface change signifies regaining of moisture to the desired level. Seeds are now returned to the polythene bags, which are sealed as before and placed in a cool situation. Bags are inspected and sorted once every seven days to remove seeds that have germinated (i.e. those showing an emerged radicle or at the white spot stage). Seeds that have not yet germinated are lightly sprayed with water and returned to the bag. Generally speaking, there is a delay of some 10-20 days after the 80-day treatment before germination gets underway. From then on, germination will be rapid and virtually complete within another 10-15 days.

Image Credit: Omex

Production of vegetables like the sweet capsicum pepper seen here, can be shifted into environmentally controlled conditions to escape growth limiting heat and drought.

Dr. Terry Mabbett in conversation with Omex Agrifluids' technical sales manager for Africa, Dr. Ben Odunlami, gathers industry insights from the company on climate change and its ongoing impact on agriculture.

Climate change on crop nutrition in African agriculture

FOR MANY YEARS, scientists have talked about climate change and its consequences for agriculture, but the time for warnings is over as the effects are already being felt. No corner of the world can escape, although Africa is where both effects and economic consequences will be most keenly felt and contested.

Climate change causes higher temperatures and drier atmosphere and soils, but perhaps, extraordinarily-severe storms on an intermittent basis will cause a gradation of effects and consequences right across the African farming scene. At its extreme, crops which have traditionally been grown in a particular part of the continent may no longer be sustainable. Selection of more heat tolerant and drought resistant varieties may save the day, while transfer of production to higher, cooler and wetter altitudes may allow traditional crops to survive.

Coffee is a classic case in point with scientists claiming how the coffee industry in Ethiopia, and one of the world's oldest, is already under threat from climate change. Avoiding a staple food supply catastrophe may mean switching to more drought resistant cereals, for instance, growing sorghum instead of maize. A combination of heat and drought may mean outdoor production of climate sensitive vegetables like tomato, capsicum pepper, aubergine and cucurbits is no longer viable, the positive alternative being environmentally-controlled greenhouse crop production. Likewise, paddy rice production may have to be modified in light of diminishing water resources.

Climate change causes higher temperatures and drier atmosphere and soils, but severe storms on an intermittent basis will cause a gradation of effects across the African farming scene.

Other considerations will centre on pest and disease prevalence. Hotter and drier growing conditions may increase the prevalence of pests and diseases, together with the levels of crop damage due to aggravating effects on the arthropod (insect or mite pest) or microbial pathogen, and/or enhanced susceptibility of the crop due to heat and drought stress. Classic crop in this context is cotton which is plagued with insect pests at the best of times, and especially seedling cotton during periods of heat and drought stress.

At the centre of all of this will be crop nutrition and fertilisation, how nutrients are applied and how much water is used to apply the plant's nutritional requirements. Maintaining water supplies will be crucial, but so will the fertiliser formulations used,

with foliar feeding increasingly important as the only sensible and sustainable way of providing the full complement of nutrients that crops need for high yields of high quality crop produce.

Industry insights from Omex Agrifluids

To obtain an insight into the thoughts of the industry on climate change, I spoke with Dr. Ben Odunlami, technical sales manager for Africa at Omex Agrifluids, a leading, global operating company in the design, production and application of soluble nutrient technology and products on a truly global scale.

Omex is based in the UK with administrative headquarters, research facilities and production plant located at Kings Lynn in the east of England. The company's worldwide operations allow Omex to have a correspondingly global perspective on climate change and its ongoing impact on agriculture.

As a vast continent encompassing a huge range of climate and weather, Africa supports a correspondingly wide range of crops, but I was particularly interested in what Dr. Odunlami would have to say about the three crop types – salad crop vegetables, coffee and cotton – which I had picked out as especially vulnerable for specific reasons, to the effects of climate change, and most of all, the type of tailor-made soluble nutrient products that Omex can offer to farmers and growers to mitigate the impacts of climate change on growing crops.

Salad crop vegetables

In regard to mode and method of crop nutrition, Dr. Odunlami agreed that diminishing water resources and water availability for agricultural and horticultural cropping would mean measured and closely-controlled application of essential plant nutrients via foliar feeding would clearly come into its own, as a warming climate tightens its grip on Africa's water resources.

"Foliar feeding puts the fertiliser in the form of water soluble nutrients onto the crop surface," said Dr. Odunlami, adding how foliar sprays of soluble, essential plant nutrients can short-circuit soil-related problems, which are likely to intensify during periods of drought and water stress for crop plants. He concurred with my thoughts about the 'ground zero' option of transferring production of crops like tomato, cucumber, capsicum pepper and lettuce from the field and into environmentally controlled greenhouses. "Production within environmentally-controlled greenhouses opens up all sorts of opportunities like soilless growing systems, fertigation and hydroponics," Dr. Odunlami said.

Given that water relations and water stress will become increasingly important factors for vegetable crops grown in the field, I asked Dr. Odunlami about specific items in the company's product portfolio that are custom-designed for this very situation.

"Our number one answer for vegetable growers faced with increasing temperatures, tightening water supply and consequent crop stress is Omex Bio 20," said Dr. Odunlami. In addition to a full complement of essential plant nutrients, Omex Bio 20 also features an exclusive organic component derived from a specific marine alga (seaweed) which imparts a strong biostimulatory effect. "Omex Bio 20 and its biostimulant properties are critically important for getting those young plants off to a good start as seedlings start to establish, However, Omex Bio 20 is also applied repeatedly throughout the following weeks to sustain that fast, firm,

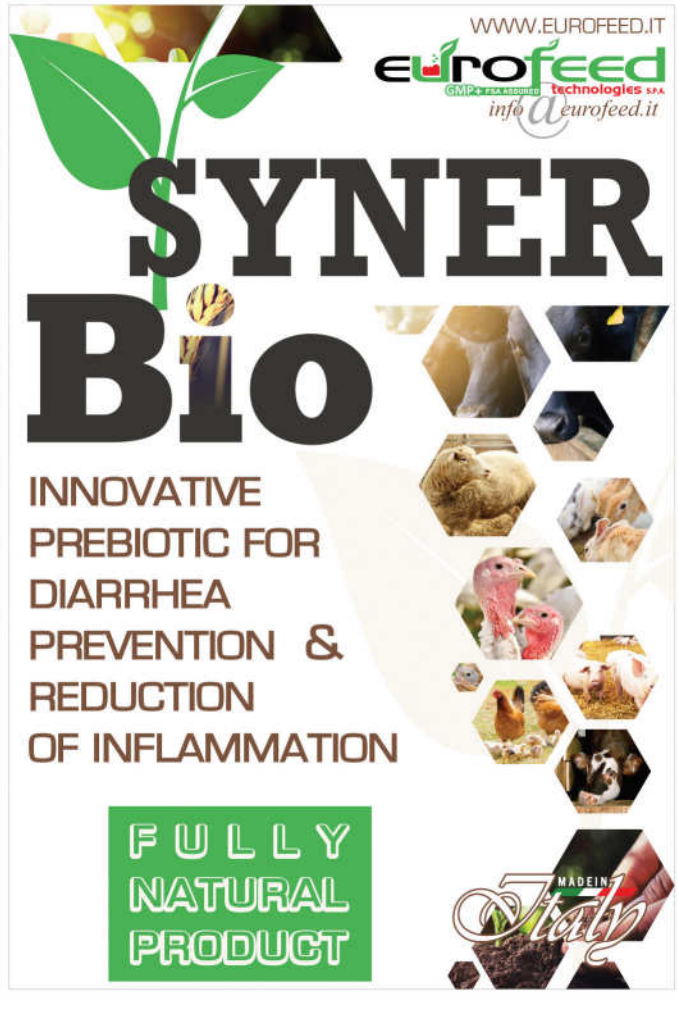
Omex Bio 20 features an exclusive organic component which imparts a strong biostimulatory effect, critically important for getting young plants off to a good start.

Image Credit: Omex

Climate change could aggravate the already serious insect pest problems for cotton.

sound and secure growth required, especially if crops face stressful growing conditions," Dr Odunlami told African Farming.

Essential plant nutrients are exactly what the name says, with crop plants unable to do without them. That said, I asked Ben if there was a particular element in the plant's nutrient profile that assumes elevated status under climate-induced, increasingly difficult growing conditions. "That would be potassium, also called the 'gatekeeper' element due to its critical control of water relations in the plant, including stomatal movements and the transport of sugars in solution," Dr. Odunlami stated. "And before you ask, we have the answer in Omex K41 with its exceptionally high concentration (41% weight/volume) of the potassium macronutrient in an entirely soluble, readily available and utilisable form."



Coffee

Africa's coffee crop is under real threat with significant areas unable to support the crop in the longer term. In the shorter term, climate change and its effect on soil structure and soil water will likely impact heavily on coffee yield, including the ability of bushes to hold onto the berry crop as well as the size and quality of the coffee beans.

Enhancing strength and resilience across the board for coffee bushes, the berries and beans will clearly be the key to sustaining the crop in its traditional growing areas for as long as possible. The nutrient mainly responsible for plant tissue and bush strength and yield resilience is calcium, so I asked Dr Odunlami what was on the table at Omex for coffee farmers.

"Omex offers a number of soluble, calcium-enriched products with Omex CalMax (22.5% weight/volume calcium), the standard 'fayre' in the Omex product portfolio and now, thoroughly tried and tested in Asia on Arabica coffee." Foliar applications of Omex CalMax enhanced the yield of coffee beans, elevated coffee bean quality and reduced the incidence of bean defects such as 'black beans' and 'broken beans," said Dr Odunlami.

Cotton

Cotton can be a uniquely profitable cash crop, but this fibre crop's susceptibility to insect pest attack from when the seed germinates, and the first leaves push through the soil, until the split bolls are safely gathered in, means that profits do not always come easily. Cotton grown under normal rain-fed conditions is less susceptible to insect pests because rainfall will wash a high proportion of insects off of the plants. In addition, the cotton plants tend to grow more rapidly and therefore 'away from' and 'out of' insect pest attack.

Omex's answer to climate and insect pest problems is a truly formidable portfolio of products for maximum plant strength and crop resilience throughout the crop cycle.

With less predictable and reliable rains, insect pest problems are likely to intensify. Cotton insecticides are increasingly falling out of favour with cotton farmers and cotton processing industries, which indicates increased reliance on crop nutrition to maximise plant resilience and mitigate pest-induced stress.

Omex's answer to such challenges is a truly formidable portfolio of products for maximum plant strength and crop resilience throughout the crop cycle.

- Omex Bio 20, a 'primer' product used pro-actively in the very early stages of seed germination and seedling establishment and continued up until the squaring (flower-bud formation) stage.
- Omex Micromax for all-round crop nutrient balance during the first 5-7 weeks of the cotton crop. Contains the complete complement of micronutrients plus magnesium and sulphur.
- Omex K41, a high potassium (41.0% w/v) soluble nutrient product reserved for post-flowering cotton and best applied as foliar sprays together with Omex Foliar Boron (15% w/v) soluble boron.
- Omex CalMax (22.5% weight/volume) and Omex SuperMn (11.50% Mn weight/volume) and/or Omex Kingfol Mn (28.90% Mn weight/volume) to supply calcium and manganese respectively, especially in the critically important post-flowering period when cotton bolls are bombarded by bollworms, and even when the open bolls and white cotton lint can be ruined by cotton staining insects (cotton stainers), just prior to harvest.

Predictions are that cultivation of coffee in traditional areas will become increasingly unsustainable with encroaching climate change.

Image Credit: Omex

A prioritised collection of forgotten food crops have revealed their potential to diversify or replace sub-Saharan Africa's major staples by 2070.

Boosting climate resilience and nutrition with forgotten food crops

A RECENT STUDY PUBLISHED in January has shown that forgotten food crops could have the ability to support more climate-resilient and healthful food systems in sub-Saharan Africa (SSA).

Recent decades have seen a massive change in land use, as well as a gradual inclination towards western food, both of which have resulted in numerous traditional African plants being neglected by mainstream cropping systems.

Climate change predictions

The modelling of still-suitable and novel climates at the production locations of major staples' in 2070 revealed the highest decline in West Africa, followed by Central Africa, with the lowest decline observed in Southern and East African regions.

Novel climate conditions were also particularly evident for maize and yams in the two highly affected subregions of West and Central Africa, suggesting that these two staples need to be diversified and replaced as a priority.

Proportionally, cassava and rice were found to be less affected across emission scenarios and subregions, with mean losses of the production locations with still-suitable climate being less than 4% and 8%, respectively.

Diversification and replacement of major staples

A method known as climate-niche modelling was used to explore the potential of forgotten food crops for crop diversification or the replacement of SSA's major staples by 2070. The study has identified East and Southern Africa as the sub-regions with the highest potential to benefit from a total of around 138 forgotten food crops used to diversify or replace four major staples namely maize, rice, cassava and yam, in 2070.

Moreover, a subset of 58 prioritised crops comprising a large numbers of fruits and leafy vegetables rich in vitamin A and C, iron, folate and zinc were found to have the highest coverage for still-suitable and future climates at production locations of major staples. In addition to these, cereals and pulses were also included in the final list of prioritised food crops. Being rich in calories, proteins and micronutrients, cereals and pulses were considered to be good choices for crop diversification or replacement.

Combining forgotten food crops from different groups for diversification or replacement of cropping systems of major staples will increase micronutrient concentrations in food production.

Therefore, appropriately combining forgotten food crops from different food groups for diversification or replacement of cropping systems of major staples will increase micronutrient concentrations in food production that otherwise remain low in the production of major staples, while providing alternatives for macronutrients too.

Moreover, since current policies do not pay sufficient attention to forgotten food crops, major partnership initiatives such as the Africa Breeding Consortium and the African Orphan Crop Consortium have been established to help address delivery constraints. In addition, improvements in biodiversity-related policies that provide crop variety exchange, genetic resources' access-and-benefit sharing, and crop commercialisation would also be needed, both in sub-Saharan Africa and at a global level, in order to further scale the supply of suitable varieties of forgotten food crops.

Image Credit: Adobe Stock

Climate-niche modelling method was used to explore the potential of forgotten food crops.

New technology for balers is making storage for agricultural products more efficient.

Advancing technology for balers

FARMING HAS BECOME much easier, thanks to agricultural balers, which reduce labour costs and increase the speed of the harvesting process. They typically include a pick-up mechanism for gathering agricultural product, a baling chamber for compressing and forming the product into a bale, and a tying device for securing the bale.

There are different types of balers, and their use depends on the varying needs of the farm professionals using them.

Round balers allow the user to create round bales of numerous sizes, while square balers create square-shaped bales, which are usually smaller than round bales.

Finally, there are the larger square balers, which are ideal for large scale farming.

Together, the machines increase efficiency and quality, while reducing both waste and storage space. Overall, these create cost savings for farmers and agricultural businesses.

Over the years, balers have become more sophisticated to include added features. For example, Massey Ferguson released the SimplEbale in February this year. The baler is manufactured by agricultural company AGCO, which is headquartered in Georgia, USA.

KUHN's VB variable chamber balers and VBP BalePack include a humidity sensor, which can measure moisture composition in the forage up to a level of 40% dry matter.

KUHN's VB variable chamber balers include a humidity sensor.

Image Credit: Johnston Tractors

SimplEbale is an electronic aftermarket monitoring and control system that retrofits onto new and existing Massey Ferguson Hesston 1800 Series Small Square Balers and simplifies the work required to make consistently high-quality hay for operators of all experience levels.

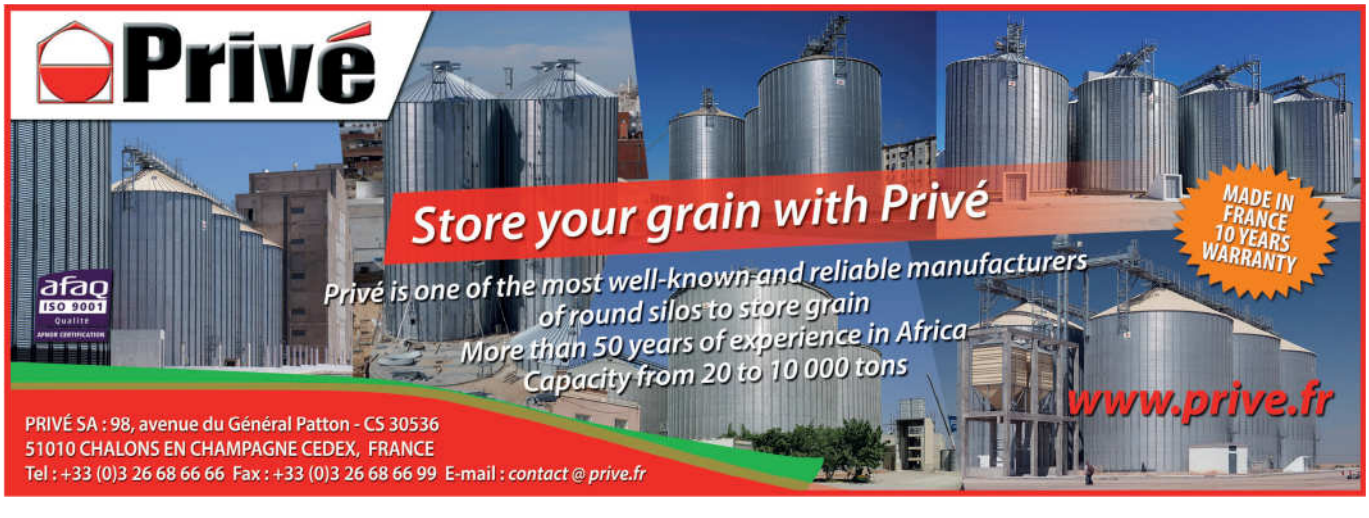
The SimplEbale was showcased by AGCO at the at World Ag Expo in Tulare, California on 14 February this year.

The solution's modular format allows farmers to select the options that best suit their unique operations with minimal modifications to their existing machines.

The kit A bale weighing system is being launched as an option on KUHN's FBP BalePack and VBP BalePack baler-wrapper combinations, from 2021 onwards. Mounted on the wrapping table, this technology weighs each bale and provides rolling average of the previous three bales, allowing an estimation of total production of forage or straw. The base package is compatible with select aftermarket moisture systems and consists of the user interface, electronic fan control, flake counter, bale length monitoring, and cab-based hydraulic pressure readout.

These components provide increased visibility of the machine while in operation and real-time updates of the bale being produced. Optional upgrades include an automatic knotter lubrication pump, bale scale, LED lighting, and hydraulic density control.

The SimplEbale electronics package can



be implemented with open-source software and hardware, and it will work with upcoming features. A flake-by-flake indication that offers quick feedback allows operators to alter ground speed without having to wait for a bale to knot is one example of the intuitive interface's assistance that makes operation and maintenance simpler.

"SimplEbale delivers better hay with less work," said Dane Mosel, tactical marketing manager for Massey Ferguson North America. "By retrofitting onto new and existing 1800 Series small square balers, SimplEbale is an affordable solution that demonstrates AGCO's and Massey Ferguson's farmer-first commitment to our customers and their operations."

Apart from this, KUHN Farm Machinery announced technological upgrades to its forage and straw baling equipment in April 2023. These upgrades include a humidity sensor on KUHN's VB variable chamber balers and VBP BalePack, which can measure moisture composition in the forage up to a level of 40% dry matter.

The humidity sensor is available on all models in the VB and VBP ranges from 2021 and will be retrofittable onto 2021 machines and beyond.

In place of net binding, the VBP BalePack is now offered with KUHN's highly regarded film binding technique as of 2020. Over the course of several years, this technique has been effectively used on the FBP BalePack and the small i-BIO baler-wrapper combination.

Apart from this, a bale weighing system is being launched as an option on KUHN's FBP BalePack and VBP BalePack baler-wrapper combinations, from 2021 onwards. Mounted on the wrapping table, this technology weighs each bale and provides rolling average of the previous three bales, allowing an estimation of total production of forage or straw.

F&F wrapping is a dual wrapping process that combines SilotitePro balewrap with Baletite netwrap replacement film

These two balers are equipped with KUHN's progressive density baling chambers and are suitable for handling a range of wet and dry crops: from hay and straw (5-20% moisture), to haylage (18-35% moisture) and silage (35-80% moisture).

Technological advancements on KUHN's SB square baler series include an improved pick-up and an enlargement of the bale channel to improve bale density uniformity.

The redesigned power feed roller actively follows the height of the swath at the intake end, and the total tine-to-tine breadth within the pick-up has been enhanced.

This enhances crop flow uniformity to the rotor, decreasing peaks in power consumption and lowering the chance of clogs.

The bale channel length is now 375cm at the output end, with a total of nine cylinders.

This maintains uniformity in bale density, which is especially important when baling very dry material.

Bale wrapping solutions, meanwhile, have also seen technological advancements. Silotite's solutions can be used as an example. Film&Film (F&F) wrapping is a novel dual wrapping process that combines SilotitePro balewrap with Baletite netwrap replacement film.

This results in better-shaped, more compact bales that can handle handling better. By decreasing mould development and avoiding silage from being entwined during feedout, using baler film instead of netwrap F&F wrapping method helps to decrease silage losses. In the F&F wrapping system, the strong holding power of Baletite maintains the pressure provided during baling. F&F bales were found to be 2cm smaller in circumference than typical netting bales in trials.

Image Credit: Johnston Tractors

The SimplEbale A bale weighing system is being launched as an option on KUHN's FBP BalePack and VBP BalePack baler-wrapper combinations, from 2021 onwards. Mounted on the wrapping table, this technology weighs each bale and provides rolling average of the previous three bales, allowing an estimation of total production of forage or straw.

Using Silotite's F&F solutions means that customers can get denser bales, improved silage quality, and increased ease of working, apart from optimised recycling.

Furthermore, each reel is tagged uniquely to enable 100% traceability in the unlikely case of a malfunction.

SilotitePro and Baletite are made by a business that is ISO9001, ISO14001, and ISO45001 certified.

Advancements in AI and deep learning are increasingly being applied to sorting and grading processes as a means boosting effectiveness and economical gains to a large extent.

Paving the way for smarter sorting and grading systems

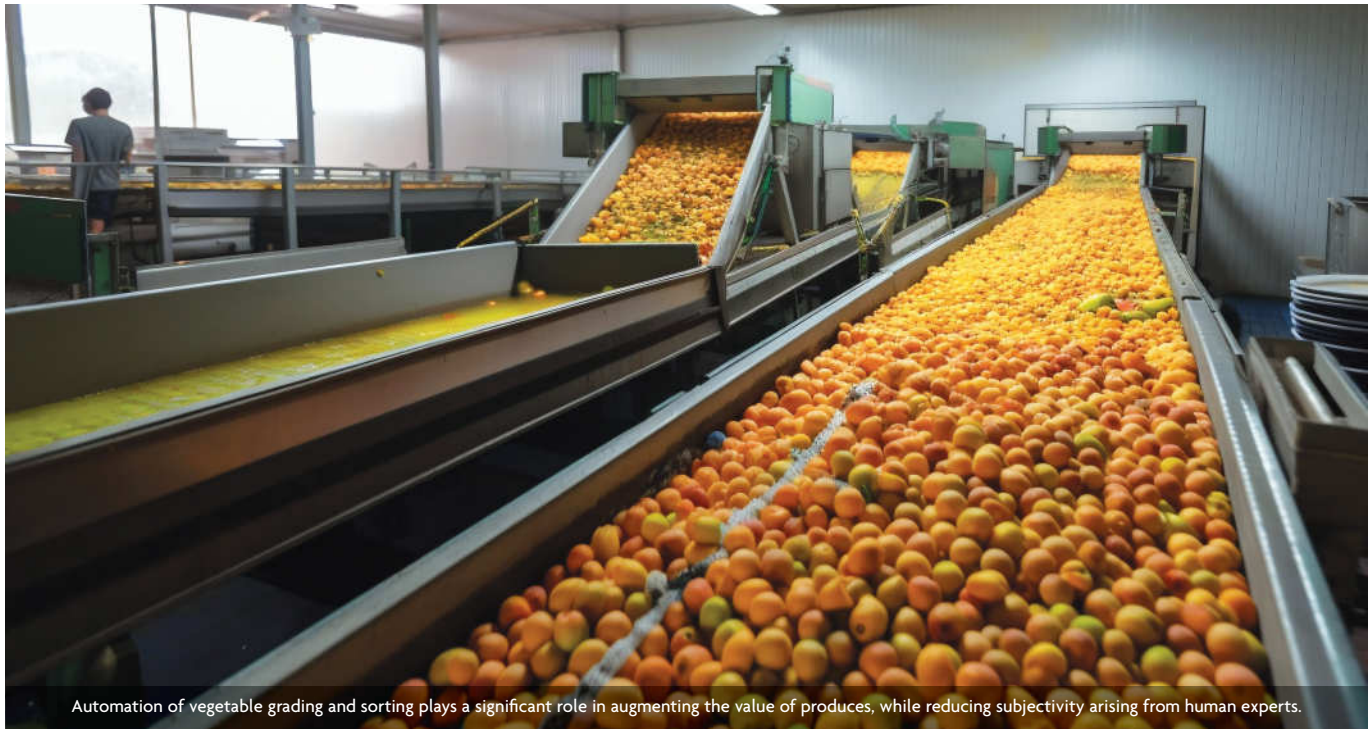


Image Credit: Adobe Stock

Automation of vegetable grading and sorting plays a significant role in augmenting the value of produces, while reducing subjectivity arising from human experts.

FRUITS AND VEGETABLES once harvested, often fall victim to pests, disease or evaporation of moisture, which physically damages the produce and results in poor yields. Therefore, grading and sorting of the produce is essential to prevent further loss and gain a good price for the yield.

Sorting is a process that separates the good produce from undesirable materials such as stones, leaves, debris, and also immature or rotten produce, ensuring that only the good quality produce passes forward for further processing/the market. The separation is carried out on the basis of a number of factors including shape, weight, size, appearance, and colour. Grading on the other hand, is the classification of the selected produce into classes or grades, based on end use, quality incorporating commercial value, and official standards.

While both these processes were earlier being carried out manually, customer demands and marketing standards have been consistently increasing over the years. Hence, farmers need specific and high-quality equipment to elevate their produce and remove inconsistencies, while also saving money, time and effort.

Sorting and grading machines for fruits and vegetables can be classified into four types, namely screens, roller sorters/ graders, weight sorters/ graders and diverging belts. Also, when comparing the two, grading is generally regarded a tedious process requiring trained experts and top-line equipment.

Significance of AI in grading and sorting

Since artificial neural networks are best suited for issues regarding automated pattern recognition, they can very conveniently be adopted in vegetable sorting and grading processes.

Artificial neural networks being best suited for issues regarding automated pattern recognition, can very conveniently be adopted in vegetable sorting and grading processes.

Besides this, using AI offers a plethora of other advantages. For instance, automation can reduce the costs by promoting production efficiency. Automation of vegetable grading and sorting plays a significant role in augmenting the value of produces. Moreover, it adds to the benefit of reducing subjectivity arising from human experts. Overall, automated grading and sorting of vegetables helps in raising the economical gains to a large extent.

A 2022 study presented an accurate vegetable grading system in which artificial neural networks were hybridised with genetic algorithms, in order to eliminate the drawbacks of the existing back propagation algorithm.

The five working phases of the vegetable grading model include:

- **Image acquisition:** A camera was set up to acquire the images of the vegetable chosen as a sample for the model.
- **Pre-processing:** At this stage, the

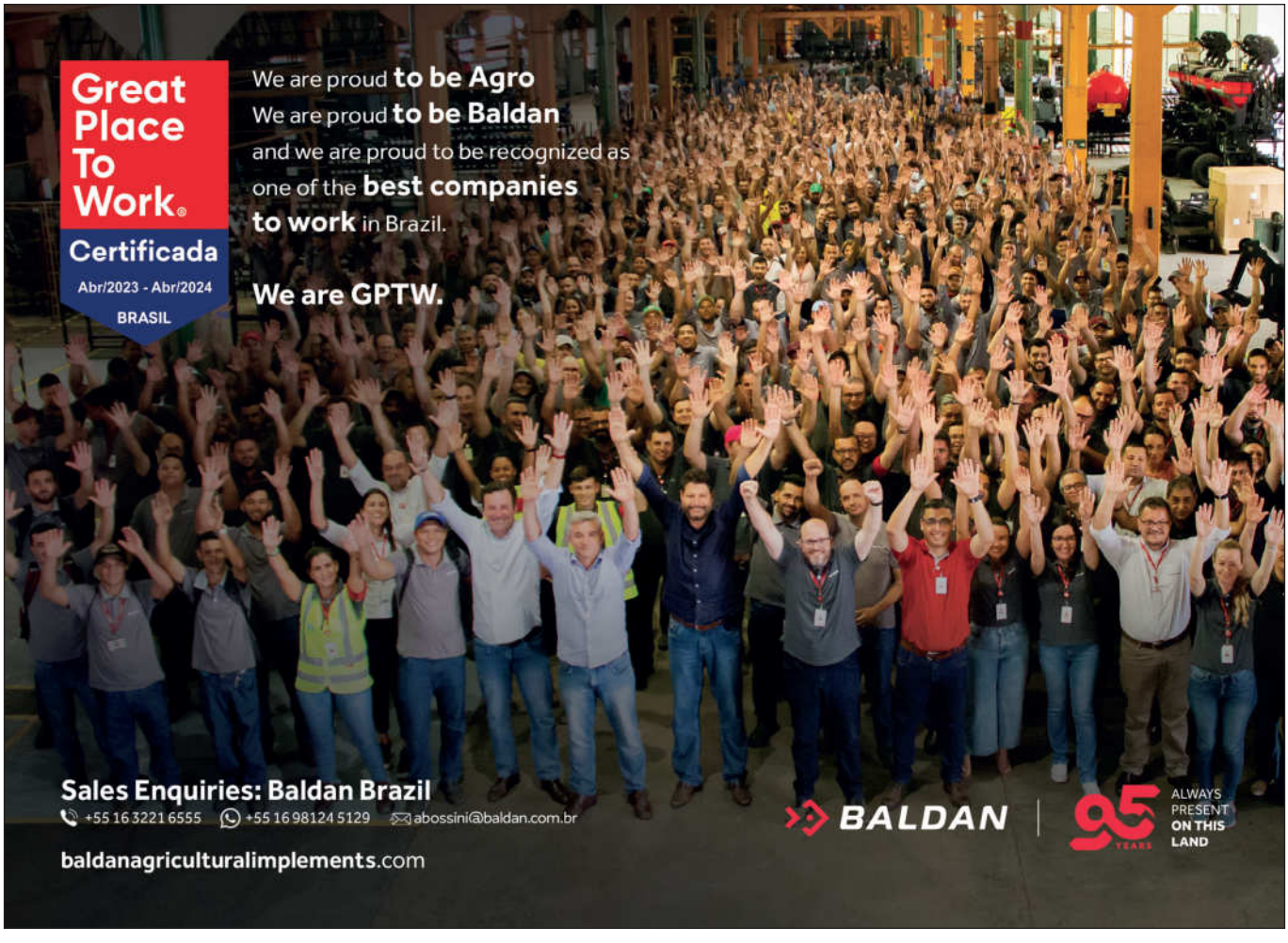
images acquired were resized and cropped to fit a fixed size of 100x100. The images were then enhanced using the Weiner filter, which performed less smoothing for regions of large intensity variance and more smoothing for regions of small variance values. This makes the filter especially useful for retaining vegetable edges while smoothing off small bruises on the surface.

- **Segmentation:** Otsu threshold-based segmentation method was used for separating the vegetable object from the rest of the image.
- **Feature extraction:** At this stage, two feature sets, namely colour based and shape based feature sets were extracted. Two perimeter values were also taken. Perimeter-O denotes the perimeter value of the object of interest obtained after Otsu segmentation and Perimeter-S denotes perimeter value of vegetable as well as defect (if any) on the vegetable surface. Perimeter-S was then computed using the Sobel edge detection technique. The basic idea behind perimeter compute was to grade the vegetable according to its colour, shape and defect. While color and shape could be directly obtained from features, defects could be indirectly obtained by comparing the Otsu perimeter and Sobel perimeter. A difference in perimeter values indicated that the defect was present. If not, the vegetable could be considered non-defective.
- **Vegetable classification:** This was regarded as the final step, performed using the hybrid genetic algorithm based back propagation approach. The output of this step was in the form of text that specified the class that the vegetable belonged to. Based on these classes, further grading was performed. The grading rules included: assigning class A

Machine learning can be applied to optical and visual grading systems, which allow fruit images to be analysed by dedicated algorithms.

Image Credit: Adobe Stock

Mechanical sorters although fast and reliable, are limited in that they test only generic criteria.



to non-defective vegetables, class B to vegetables having nominal surface defects and class C to defective vegetables. Hence, vegetable grading was performed based on these rules.

Overall, the model showed remarkable performance when compared with the existing back propagation neural networks (BPNN). Having achieved an accuracy rate of 93.3% in contrast to BPNN with only 73.3% accuracy, the model has thus been proposed for future perspectives.

Deep learning and its applications in the agricultural sector

Deep learning is basically a subset of machine learning, which is essentially a neural network with three or more layers, attempting to simulate the behaviour of the human brain and allowing it to learn from large amounts of data. Deep learning drives many AI applications and services that improve automation, performing analytical and physical tasks without human intervention. Besides these applications, deep learning also has the potential to revolutionise the agricultural industry by enabling more efficient crop production, precision agriculture, and improved crop monitoring and forecasting.

In the context of fruit and vegetable grading, machine learning can be applied to optical and visual grading systems, which allow fruit images to be analysed by dedicated algorithms. Visual defect detection aided by algorithm-based visual systems is already in use worldwide. Its main goal is to detect as large a set of defects as possible under the form of colour variations, local scratches, bumps and irregular shapes.

Agricultural produce is generally analysed by classical image processing algorithms. In addition, multi-threshold algorithms are also used to isolate phenomena along geometric contour trackers. All these algorithms however, require a tuning effort to ensure accurate performance with minimal false or miss-detection. This means that the actual performance is highly dependent on the quality of the visual system and on the effort done in the tuning. A higher skilled operator often ensures better algorithm tuning and performance.

The emergence of modern methods such as deep learning has successfully challenged the human factor in these traditional vision algorithms. This allows the tuning phase to be replaced by automatic learning. RSIP Vision, an established leader in computer vision and image processing R&D, has been using this highly capable technology to revolutionise the grading and sorting processes. The most notable advantage of this technique is its ability to not only be fast and reliable, but also yield a consistent performance.

AI applications in on-farm sorting: future scope and challenges

Although AI and machine learning systems are efficiently designed to perform sorting and grading functions, there is still a long way to go. Research is underway to identify and acknowledge the numerous challenges associated with these systems and ensure that continuous improvements are made to meet future requirements.

RGB and CCD cameras are the most common sensors used for on-farm sorting. However, these cameras can only detect surface and superficial appearance parameters such as shape, color, and size. Therefore, there is currently a demand for sensors that meet the requirements for high throughput function and low cost. While sensors such as hyperspectral cameras, lasers, and NIR for defect detection have been developed for factory sorting lines, more advanced sensors and techniques that offer improved performance in terms of internal disease and defect detection are needed, prior to making this technology widely accessible for adoption in small farms and orchards.

Ongoing research has shown that AI models have proven to be more effective for harvesting than on-farm sorting. Hence, in order to improve the performance of on-farm sorting, research on ripeness and quality detection could be introduced and modified for fruit and vegetable harvesting.

Another limitation is the dataset used for the AI model of on-farm sorting. Previously, datasets were mostly used for individual research using limited varieties and cultivars. These collections could result in tendencies of model overfitting and reduce the accuracy of the AI model. Moreover, since data was collected either indoors or outdoors, environmental conditions have affected illumination. As a result, the diversity of datasets for on-farm sorting has not been fully developed.

Hence, it is suggested that additional data samples, including more diverse production circumstances and different cultivars are used, to improve the generalisation ability of AI models. Open-source image datasets could be another solution for expanding the samples to avoid overfitting in AI model training. Furthermore, a findable and accessible dataset that includes more fruit types and varieties conducted in different environmental conditions would be beneficial to expand the dataset for generalisation and development of AI algorithms and to prompt the on-farm sorting industry for small farms and orchards.

On-farm sorting of fruits is generally more profitable than vegetables. Therefore, most farmers are generally hesitant while investing in AI and robotics for on-farm vegetable sorting. In recent years however, organic vegetables that are more dependent on skilled management have started gaining popularity in the fresh market. This is seen as a great opportunity for the development of AI in the on-farm sorting of specialty vegetables such as tomatoes, peppers, and cucumbers.

Initially, researchers only focused on the AI models for the sorting lines of big commercial producers, and the AI models tended to be developed for sorting the produce that was directly transported from farms and orchards to factories, rather than for the on-farm stage that occurs before transportation. Increased costs meant that small farms and orchards had limited

Image Credit: Adobe Stock

To improve the performance of on-farm sorting, research on ripeness and quality detection could be introduced and modified for fruit and vegetable harvesting.

access to automated fruit sorting lines. The development of sensor technology and AI models has now opened up the potential for automated fruit sorting in small farms and orchards. In recent years, customer demand for high-quality produce has promoted the on-farm management of small farms and orchards. Consequently, small producers have gradually realised the importance of replacing costly labour with automated sorting systems to save costs and improve efficiency, whereupon AI models for on-farm sorting systems have been introduced.

However, AI models for on-farm sorting are still less focused on researchers compared to those for big factories. The limitation of factory sorting used for on-farm sorting is that the AI models and sensors may not be efficient for the on-farm environment due to operational demands such as lighting, working conditions, and throughput requirements.

Image Credit: Adobe Stock

AI models developed for factory sorting lines should be modified and fine-tuned to meet the requirements and environmental conditions of an on-farm operation.

Small producers have gradually realised the importance of replacing costly labour with automated sorting systems, whereupon AI models for on-farm sorting have been introduced.

As a matter of fact, the purpose of factory and on-farm sorting is the same: to sort and grade produce and remove unwanted items. Therefore, an on-farm fruit sorting system could adopt the AI models developed for factory sorting lines due to their prevalence and effectiveness, but it should be modified and fine-tuned to meet the requirements and environmental conditions of an on-farm operation. Meanwhile, the development of flexible and low-cost sorting lines for on-farm sorting could provide solutions for reducing the costs for big factories. Hence, it is anticipated that the development of AI models for fruit sorting would be beneficial for both factory and on-farm sorting.

Drip irrigation is an efficient water and nutrient delivery system for growing crops.

Image Credit: Adobe Stock

Water scarcity is one of the most pressing issues facing the world today – and nowhere more so than Africa, home to some of the world's most water-stressed countries. Effective management of water in agriculture is vital.

Addressing water scarcity in agriculture

WATER SCARCITY, EXACERBATED by climate change and population growth, "means less water for agriculture production which in turn means less food available, threatening food security and nutrition," said Li Lifeng, director of the Land and Water Division, FAO, in an interview. "Considering that the world population will reach around 9 billion in 2050, it is clear that water scarcity is a real threat to food security, since more food will have to be grown with limited water resources."

Effective management of water resources and improving the efficient use in agriculture is therefore critical. The FAO hosts the Global Framework on Water Scarcity in Agriculture (WASAG), whose mission is to drive the improvement and adaptation of agricultural systems in conditions of increasing water scarcity and climate change. It brings together countries, intergovernmental organisations, UN agencies, academic and research institutions, civil society, NGOs, private sector organisations and trade associations to find collaborative solutions.

The Second International WASAG Forum held in February in Praia, Cape Verde, adopted measures ranging from mobilising political support, stepping up international and cross sectoral collaboration, and actions on innovative financing mechanisms, farmer-led approaches including the youth, inclusive technologies, digital agriculture, coupling agriculture water management with food, nutrition and water, sanitation and hygiene (WASH), dryland agriculture, saline agriculture, coping with migration, etc.

WASAG has the potential to play a particularly significant role in Africa, where water management is an important issue, given that only 6% of available freshwater resources has been stored behind dams, making the continent vulnerable to climate change. The Second WASAG Forum saw strong participation from Africa. The African Union, an active partner, has also requested WASAG to facilitate training on the guidelines for pressurised irrigation, in response to the increasing need for supplemental irrigation in Africa.

Various initiatives are underway across Africa to improve water management and address water scarcity in agriculture:

It is clear that water scarcity is a real threat to food security, since more food will have to be grown with limited water resources.

East Africa

In East Africa, more than 2 million farmers are set to benefit from the EU-funded Climate Smart Water Management and Sustainable Development for Food and Agriculture in East Africa (WatDev) project covering Kenya, Sudan Ethiopia and Egypt. It aims to ensure sustainability of agricultural water management and resilience of agro-ecosystems to climate change in East Africa and Egypt, where scarcity or limited availability of water resources and climate conditions severely compromise agricultural production and food security in many of the regional countries.

The project will help national ministries and research institutions improve their knowledge and management of water in agriculture, and help farmers, cooperatives and water user associations implement innovative/sustainable water management solutions and skills. It will carry out institutional and individual training and capacity building for water management and will collect, analyse, and implement available best practices and innovations in study areas and simulate their impact scenarios with the use of models and knowledge accumulated in regional water studies.

Initiatives include establishing a regional water knowledge hub for training and capacity building services on regional/trans-national water management in East Africa, implementation of a regional water management and knowledge portal and developing a water planning/management toolbox for researchers and institutions.

In Kenya, the project targets Bura and Hola irrigation schemes along the lower

Tana River.

At a WatDev meeting in Nairobi, Eliud Kireger, director of Kenya Agricultural Research and Livestock Organisation (KALRO), said lower Tana was chosen because of various challenges, including fluctuation of water levels and meandering of the river which causes damage to cultivated fields close to the bank.

The Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) executive director, Enock Warinda said Kenya has made strides in terms of development of water best management practices and also registered its farmers, thus standing a better chance of assisting in access and efficient use of water.

Another initiative addressing water insecurity in Kenya and East Africa is the launch of the Water Police Unit (WPU), aimed at protecting water infrastructure against vandalism and theft.

West Africa

In Ghana, where rice is fast replacing several staples and indigenous foods, the Crops Research Institute (CRI) under the Council for Scientific and Industrial Research (CSIR) has introduced a water-saving irrigation technology called alternate wetting and drying (AWD) to rice farmers at Weta in the Ketu North district of the Volta Region, according to a report in Ghana Business News.

AWD is a water-saving technology that farmers can apply to reduce their irrigation water consumption in rice fields without decreasing yield, and has been shown to improve the level of micronutrients in rice grains. In AWD, irrigation water is applied a few days after the disappearance of the ponded water. Hence, the field gets alternately flooded and non-flooded. The number of days of non-flooded soil between irrigations can vary from one to more than 10 days depending on a number of factors such as soil type, weather, and crop growth stage.

Research on the AWD by CSIR-CRI and its partners in the UK is reported to have identified numerous benefits, such as minimising water and nutrient use, and improved yields, that could result in increased income for the farmer as well as savings in labour and fuel used in pumping water for irrigation.

AWD is a water-saving technology that farmers can apply to reduce their irrigation water consumption in rice fields without decreasing yield.

North Africa

North Africa is home to some of Africa's most developed agricultural economies, such as Morocco, whose location in the heart of EMEA and extensive transport infrastructure enable its high-value crops to be easily shipped to European markets.

However, here too, the climate poses serious challenges to farming. Netafim, an Orbia business and a global leader in precision agriculture solutions, has opened its first manufacturing plant in North Africa to enhance the successful implementation of precision irrigation in Morocco and strengthen the country's agricultural sector. Netafim's precision irrigation technologies are ideal for use in arid conditions, maximising yields while conserving resources.

"Netafim's factory is built right in the heart of an agricultural region to enable farmers in Morocco and across North Africa to derive enormous benefit from precision irrigation. Netafim will provide local farmers with our state-of-the-art products and services and share our agronomic and technical expertise for greater yields and long-term sustainable agriculture practices," said Gal Yarden, senior vice president of Netafim's EMEA division.

Southern Africa

Namibia, one of the driest countries in Africa, has suffered several droughts which have damaged the country's agriculture and economy and resulted in serious food shortages. Low crop yields are a problem, especially against a background of increasing climate change.

With support from the International Atomic Energy Agency (IAEA) and the FAO, farmers in the northern regions of Kavango East, Kavango West, Omusati, Oshikoto and Tsumeb are now using a combination of nuclear techniques and a water-saving irrigation technology, known as small-scale drip irrigation, for watering their fields. Based on cosmic ray neutron sensors, which provide real-time data on soil moisture, it has allowed farmers to deliver small but precise amounts of water directly to the plants. enabling them to work out exactly how much water and nutrients to use and when, thus helping to reduce water use.

This system has helped increase irrigation water use efficiency by more than 80% compared to rainfed agriculture, and has improved yields by up to 70% in the participating farmers' fields. The IAEA and FAO are working with scientists in Namibia to advance the application of drip irrigation to protect crops amid severe droughts. The government is also looking to introduce more small-scale drip irrigation systems to increase the efficiency of agricultural output, protect water resources and expand the cultivation of high-value crops, such as onions, tomatoes and cabbages.

Access to finance through digital advances in the rural sector is a challenge several farmers are hoping to overcome.

Transforming agriculture through financial innovations

RURAL FINANCE PLAYS a crucial role in the development and transformation of agriculture in Africa. Over the past two decades, world agricultural markets have experienced consistent growth, presenting numerous opportunities for agri-businesses in developing countries. However, the realisation of this potential has been hindered by the limited access to agricultural finance, predominantly sourced from informal channels.

Recognising the significance of inclusive finance in promoting rural transformation, the Food and Agriculture Organisation (FAO) actively addresses the constraints that impede the provision of financial services to smallholder families, including women and youth, as well as small agri-businesses. The objective is to stimulate investment, mitigate risks, and support the rural poor.

FAO collaborates with governments, producer organisations, agri-businesses, and financial institutions, including the regional Rural and Agricultural Credit Associations (RACA) established with FAO's assistance in the late 1970s. Through this collaborative approach, FAO facilitates the development of tailored policies and regulatory frameworks for rural financial inclusion, fosters innovation within financial sectors to reach marginalised rural populations, and promotes knowledge exchange and cooperation among countries.

"Financial resources play a pivotal role in driving rural development in Africa."

Financial resources play a pivotal role in driving rural development in Africa. However, accessing agricultural finance remains challenging due to the dominance of informal sources. To address this issue, the FAO is working to improve access to finance for smallholder families, small agri-businesses, women, and youth.

FAO collaborates with governments, producer organisations, agri-businesses, and financial institutions to develop tailored policies and regulatory frameworks. By addressing both supply and demand-side constraints, FAO aims to enhance the flexibility, diversity, affordability, and accessibility of financial products and services offered by formal financial institutions.

Policy coordination across government agencies, such as Ministries of Finance, Agriculture, and Social Affairs, along with central banks and financial regulators, is essential. Collaboration with financial institutions and private agribusiness firms is also encouraged to ensure scalable and cost-effective interventions that reduce constraints in rural financial markets.

Gender equality is a priority, and policies must consider the financial needs of women and the limitations faced by financial institutions in supporting them. FAO promotes innovative approaches, including information and communication technology (ICT), product and process improvements, and partnerships, to deliver demand-driven, customer-centric financial products and services. Special focus is given to traditionally excluded groups such as farming families, small- and medium-sized agribusiness enterprises, women, youth, and indigenous communities.

Image Credit: Adobe Stock

The world agricultural markets have experienced consistent growth over the past two decades.

Amid the COVID-19 pandemic, policies should aim to promote access to a range of financial services for vulnerable rural populations. Cash transfer schemes can enhance livelihood resilience and food security for informal workers, women, and youth. Additionally, providing short- and medium-term credit to micro-, small-, and medium-sized businesses can mitigate the impact of lockdowns and reduced demand. The digitalisation of financial services is crucial, requiring comprehensive efforts at both the supply and demand sides.

Rural and agricultural financial products have the potential to significantly impact the livelihoods of African populations, especially considering that more than 60% of people in sub-Saharan Africa depend on the agricultural sector for their livelihoods. However, access to these financial products remains limited, particularly in rural areas where the majority of the population resides.

The impact of different types of rural and agricultural financial products on African populations has been studied, although its understanding is still limited. The Evans School Policy Analysis & Research Group (EPAR), in partnership with the MasterCard Foundation, conducted a review of 38 high-quality studies focused on sub-Saharan Africa. These studies examined the effects of financial products such as microcredit, savings, insurance, and mobile money on measures of production, consumption, wealth, and resilience.

Microcredit programmes, which provide small loans to poor individuals, including rural farmers, have shown positive impacts on household incomes. Savings products have helped farmers build assets and prepare for seasonal shocks inherent in agriculture. Crop insurance has reduced risk for farmers from extreme weather events, while health insurance has protected them from

unexpected health expenses. Mobile money has facilitated easier and more accessible financial transactions for rural populations.

However, the impacts of these financial products vary across different studies. While some studies have reported significant positive impacts, such as increased household incomes and reduced child labour, others have found no significant effects on crop production or profits. It is worth noting that the impact of these products can differ among individuals, with some benefiting, while others may experience negative outcomes.

In recent years, technology has transformed the accessibility of finance for smallholder farmers in Africa, as highlighted by Centre for Strategic & International Studies commentator, Connor M. Savoy. These farmers, constituting the majority of agricultural workers in Asia and sub-Saharan Africa, are essential contributors to food production. However, they face numerous challenges, including limited access to critical inputs, inadequate infrastructure, and post-harvest losses.

Access to finance remains a critical barrier for smallholder farmers. Local financial institutions perceive them as risky, lacking specialised products for the sector, while the farmers themselves often lack collateral or are averse to financial exposure. The resulting funding gap amounts to US$170bn in Africa, Latin America, and Asia.

To address this, development finance institutions (DFIs) have embraced innovative financial models. Notably, organisations like One Acre Fund and Babban Gona offer credit for essential inputs, thereby increasing yields and incomes. DFIs play a pivotal role in de-risking investments, encouraging local financial institutions to support smallholders. The US International Development Finance Corporation (DFC) has actively provided loan guarantees and direct loans to entities like One Acre Fund.

To deepen financial services, Savoy suggests several steps for DFIs. Developing specialised personnel in agricultural investment is crucial to creating targeted financial products. Localising investments and understanding hyperlocal needs will strengthen their presence. Innovative financial products, including local currency loans, can cater to smallholder farmers' unique challenges, complemented by technology-driven solutions.

Partnerships with successful organisations like One Acre Fund and Babban Gona are essential for maximising impact. These partnerships, along with grant-based technical assistance, empower farmers with necessary skills and knowledge for qualifying for loans.

In essence, technology-driven financial innovations have the potential to transform the lives of smallholder farmers in Africa. Through the concerted efforts of development institutions and DFIs, these farmers can overcome challenges, increase productivity, and achieve economic and social development gains. Savoy's insights underscore the transformative power of technology in uplifting those who sustain the future of agriculture.

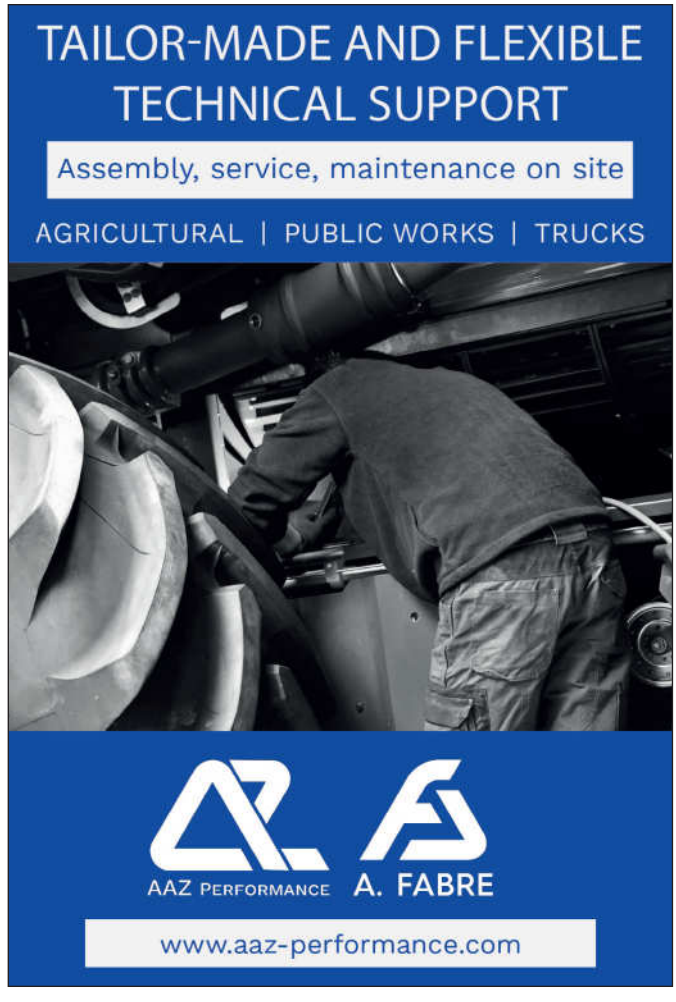
Mobile financial services (MFS) have emerged as a potential game-changer in the domain of agricultural finance for smallholder farmers in Africa, addressing the challenges posed by poor transportation and communication infrastructure, small financial transactions, and inherent risks associated with small-scale farming. Over the last two decades, various digital financial services accessible through mobile phones, including mobile money, mobile banking, mobile payments, mobile savings, and mobile loans, have become increasingly available, holding the promise to overcome traditional banks' limitations in serving the small farm sector.

"Technology-driven financial innovations have the potential to transform the lives of smallholder famers in Africa."

Empirical evidence drawn from nationally representative data of farmers in Kenya sheds light on the impact of MFS on African farmers. The findings reveal that more than 82% of farmers utilise mobile money, while close to 20% use mobile banking — a notable trend considering Kenya's pioneering position in MFS innovation, particularly with its successful mobile money service M-PESA introduced in 2007.

Image Credit: Adobe Stock

Access to finance remains a critical barrier for smallholder farmers.



However, the application of MFS for agricultural activities remains limited. Only 15% of farmers reported using mobile money for agricultural payments, with fewer than 10% employing mobile money or mobile banking savings for agricultural finance. Merely 0.6% mentioned utilising mobile banking loans for agricultural purposes, indicating that MFS has yet to significantly penetrate the agricultural sector. These low usage rates may be attributed to the lack of tailor-made financial services catering to the specific needs of the local agricultural industry.

Differences in MFS usage were observed between farmers operating in different marketing channels. Farmers selling directly to end-consumers in local markets exhibited minimal MFS adoption. In contrast, farmers selling to traders and companies displayed higher usage rates, but still below anticipated levels. This underutilisation can be attributed to the limited incentives for farmers in traditional local supply chains to switch from cash transactions to digital payments, which often incur fees. Additionally, farmers in modern supply chains, who already possess bank accounts, may find limited value in adopting mobile money for their agricultural activities.

To address these limitations, improvements and adjustments are necessary for MFS to effectively transform agricultural finance in Kenya and similar countries in sub-Saharan Africa. General infrastructure enhancements and digital literacy improvements alone may not yield substantial results since many farmers already engage with MFS for non-agricultural activities. Instead, a focused approach involving private-sector innovation and supportive regulatory environments is required.

Issues that need attention include addressing server system downtimes, transaction limits, interest rates, and repayment periods for mobile banking loans. Public-sector interventions should aim at creating consumer-friendly regulatory environments to facilitate the customisation of MFS products to better suit agricultural contexts.

Despite these limitations, MFS have proven beneficial for certain rural households in Africa, offering time savings, off-farm income opportunities, and increased incomes from remittances, which can ultimately contribute to improved agricultural productivity and higher farming incomes. Nevertheless, continuous development and customisation of MFS are vital to unlock their full potential and enhance agricultural development.

Continuing from the discussion on MFS and its potential impact on African farmers, it is essential to mention the recent development of Convergence Partners in driving digital inclusion across the continent. Convergence Partners, a leading private equity investor dedicated to the technology sector in sub-Saharan Africa, has achieved a significant milestone by successfully closing its Convergence Partners Digital Infrastructure Fund (CPDIF) at an impressive US$296mn. This fund, which surpassed its initial target by more than 18%, represents the company's largest fund to date, bringing their total funds under management to more than US$600mn.

"The closing of CPDIF is a major step forward for Convergence Partners and for the development of the digital economy in sub-Saharan Africa."

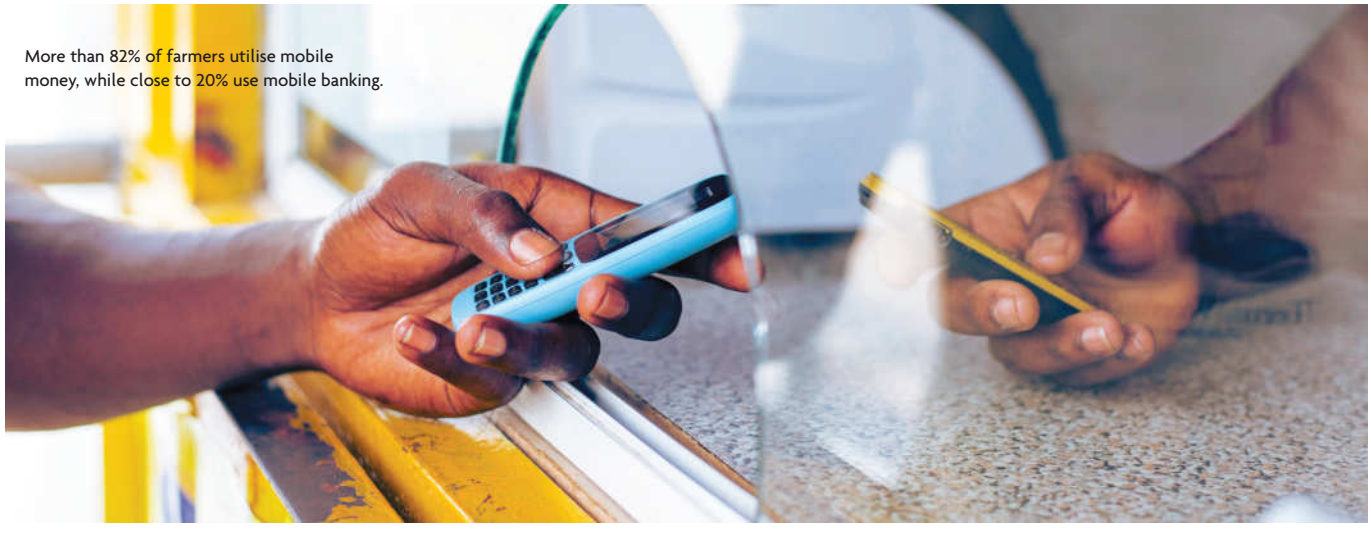
CPDIF focusses on investing in digital infrastructure opportunities throughout sub-Saharan Africa, including fibre networks, data centres, wireless technologies, towers, cloud computing, Internet of Things (IoT), artificial intelligence (AI), and other critical digital assets that support the growth of the digital economy in the region. Additionally, the fund aims to promote digital inclusion by supporting initiatives that provide access to education, financial services, healthcare, and other essential services through digital technologies.

The success of CPDIF underscores the increasing importance of digital infrastructure in the region, especially in the context of mobile financial services. As internet penetration continues to grow in sub-Saharan Africa, investments in enabling digital infrastructure become even more critical. Convergence Partners' efforts in driving digital inclusion will not only bridge the digital divide but also enable farmers and other stakeholders to fully harness the benefits of mobile financial services and other digital advancements. By providing the necessary digital infrastructure, CPDIF plays a pivotal role in advancing the digital economy across the African continent.

"The closing of CPDIF is a major step forward for Convergence Partners and for the development of the digital economy in sub-Saharan Africa," remarked Brandon Doyle, CEO and founding partner, Convergence Partners. "This closing is just the beginning, and we look forward to working with our investors and partners to build the digital infrastructure required to support the growth of the region's digital economy. We strongly believe such collaborations promote innovation, entrepreneurship, skill development, and job creation by vastly expanding access to the internet and all the essential digital tools it provides."

Further augmenting the development of rural finance, Yellow, a company that provides asset financing for solar energy and digital devices in Africa, recently secured US$14mn in series B funding in a round led by Convergence Partners. The funding round also saw participation from the Energy Entrepreneurs Growth Fund, managed by Triple Jump, and follow-on investment from Platform Investment Partners.

With the new funding, Yellow plans to further expand its operations



More than 82% of farmers utilise mobile money, while close to 20% use mobile banking.

Image Credit: Adobe Stock

in its current markets, which include Malawi, Rwanda, Uganda, Zambia, and Madagascar. Additionally, the company intends to introduce digital and financial products in the near future and prepare for future debt funding rounds to accelerate its growth trajectory.

This recent round of funding brings Yellow's total debt and equity funding raised to US$45mn, which will enable the company to continue its mission of increasing access to clean energy and digital devices across the African continent.

Building on the commitment to support Africa's agricultural sector and small and medium-sized enterprises (SMEs), the African Development Bank Group (AfDB) has made significant strides in advancing the Agri-food SME Catalytic Financing Mechanism.

"The Agri-food SME Catalytic Financing Mechanism will help unlock opportunities for these businesses in Africa, particularly for women and youth."

During the Dakar 2 Africa Food Summit, the Bank announced the establishment of this special fund aimed at de-risking and catalysing investments for agricultural SMEs, enhancing agricultural value chains, and improving food security across the continent.

SME agri-businesses play a crucial role, producing, processing, and transporting around 65% of Africa's food. However, they face an annual financing gap of more than US$180mn. To address this, the Agri-food SME Catalytic Financing Mechanism will provide concessional finance and technical assistance to financial intermediaries, such as agribusinesses, micro-finance institutions, and

Yellow intends to introduce digital and financial products to several African regions in the near future.

Image Credit: Adobe Stock

impact funds. The goal is to enable these intermediaries to extend loans to agri-SMEs, with a specific focus on businesses led by women and those embracing climate-smart practices.

The Mechanism, structured as a multi-donor trust fund, received a notable boost from Canada, which contributed US$73.5mn. By blending public funds with the Bank's financial instruments, this initiative seeks to de-risk agricultural financing and attract more private sector investment towards impactful agri-food sector projects.

"At the Africa Food Summit, we have seen a strong commitment to addressing the financing gap for SMEs and creating an environment that encourages private sector investments in climate-smart, gender-oriented agricultural solutions," said Beth Dunford, AfDB vice president for Agriculture, human and social development. "The Agri-food SME Catalytic Financing Mechanism will help unlock opportunities for these businesses in Africa, particularly for women and youth."

Digital transformation in agriculture

FARMERP, THE NEXT-GENERATION farm management platform, has brought a specialised focus on helping Cassava farmers by extending the crop life & bringing plant mortality in Cassava plantations up by 40% through its tech-enabled platform.

The platform aims to unlock the true potential of the Cassava plantation for the farmers to improve productivity, profitability and predictability. The company has successfully deployed this in Nigeria and shall further expand it to Thailand, Indonesia, Angola, Ghana.

Cassava is a vital crop for millions of people globally. With its versatile applications in food, feed, and industrial sectors, Cassava is crucial in ensuring food security, livelihoods, and economic growth.

JCB launches electric wheeled Loader

JCB IS INTRODUCING its first full electric wheeled loader, delivering best-in-class performance and full working day use, with low noise and zero-emission operation being ideal for work in livestock buildings, glasshouses and alongside farm and horticultural staff.

The machine boasts the largest standard battery pack in its class, with 20kWh capacity, providing productivity that matches the popular 403 diesel model.

JCB is expanding its full electric equipment line-up, with the launch of the 403E wheeled loader, helping farms and horticultural businesses meet the challenge of carbon reduction. The machine is powered by a 20kWh lithium-ion battery pack, assembled from proven JCB modules, as pioneered in the company's existing range of electric equipment. These batteries, coupled with high efficiency electric motors and optimised traction and hydraulic systems, deliver class-leading performance, with the loader capable of completing a full working day, or 4-5 hours of continuous use in a mixed duty cycle.

In common with the JCB E-Tech range, the 403E has a built-in charger that allows connection to a range of on-site power sources. A 110V socket will fully charge the batteries in 12 hours, while a 230V industrial or domestic plug will charge the battery pack in just 8 hours. JCB's off-board rapid charger delivers a full charge from a three-phase supply in just 2 hours.

The machine is equipped with two independent electric motors, one for the driveline and one for the hydraulics. The drive motor offers 33.4kW of power and comes with three driving modes, that the operator can toggle between using two buttons on top of the joystick. With reduced noise levels and machine vibration, the 403E is a comfortable, highly productive zero-emission loader, capable of working with a range of attachments.

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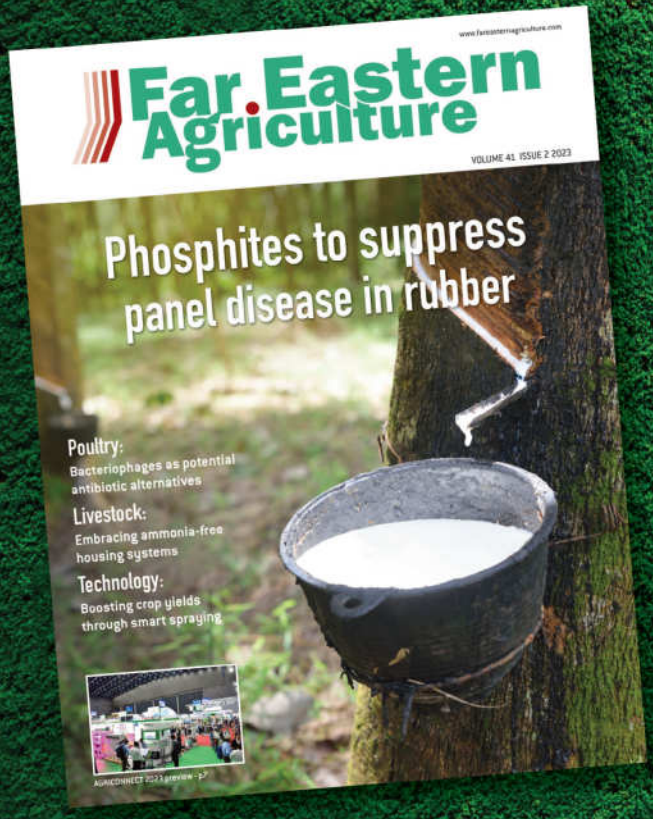

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