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March/April 2023

African Farming and Food Processing

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Solarisation becomes need of the hour

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Enhancing feed quality

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AgriTech Expo Zambia preview. p4

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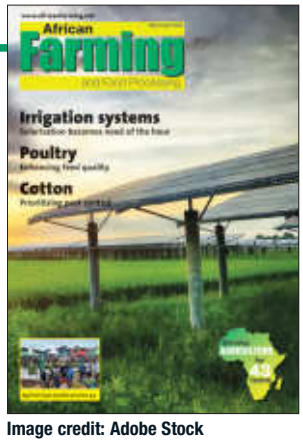

Image credit: Adobe Stock

Locally-based commercial binders are the most popular method of detoxifying feeds contaminated with mycotoxins in SSA countries.

Locator nodes are attached near the ears of the animals to help determine their position.

African Farming and Food Processing

Editor: Madhuri Ramesh E-mail: madhuri.ramesh@alaincharles.com

Editorial and Design team: Prashanth AP, Fyna Ashwath, Miriam Brtkova, Praveen CP, Robert Daniels, Shivani Dhruv, Matthew Hayhoe, Leah Kelly, Rahul Puthenveedu, Madhurima Sengupta, Louise Waters and Minhaj Zia

Publisher: Nick Fordham

Head of Sales: Vinay Nair
Tel: +971 4 4489260
Email: vinay.nair@alaincharles.com

Magazine Manager: Richard Rozelaar
Tel: +44 207 834 7676
Email: richard.rozelaar@alaincharles.com

Country	Representative	Telephone	Fax	Email
India	Tanmay Mishra	+91 98800 75908		tanmay.mishra@alaincharles.com
Nigeria	Bola Olowo	+234 8034349299		bola.olowo@alaincharles.com
South Africa	Sally Young	+27 (0) 824 906 961	+27 46 624 5931	sally.young@alaincharles.com
USA	Michael Tomashefsky	+1 203 226 2882	+1 203 226 7447	michael.tomashefsky@alaincharles.com

Head Office:
Alain Charles Publishing Ltd
University House
11-13 Lower Grosvenor Place
London SW1W 0EX, United Kingdom
Telephone: +44 (0) 20 7834 7676
Fax: +44 (0) 20 7973 0076
E-mail: post@alaincharles.com

Middle East Regional Office:
Alain Charles Middle East FZ-LLC
Office L2-112, Loft Office 2,
Entrance B, PO Box 502207
Dubai Media City, UAE
Telephone: +971 4 448 9260
Fax: +971 4 448 9261
E-mail: post@alaincharles.com

Production: Rinta Denil, Ranjith Ekambaram, Nelly Mendes and Infant Prakash
Email: production@alaincharles.com

Subscriptions: circulation@alaincharles.com

Chairman: Derek Fordham

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Farming Calendar 2023

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28-30	Agrofood & Plastprintpack Nigeria 2023 *https://www.agrofood-nigeria.com/*	LAGOS
APRIL		
20-22	AgriTech Expo Zambia *https://www.agritech-expo.com/*	CHISAMBA
MAY		
16-18	Pan-African Poultry Conference (PPC) *https://www.cersa-togo.org/*	LOME
16-19	Nampo Harvest Day *https://www.grainsa.co.za/pages/nampo*	BOTHVILLE
JUNE		
06-08	IFTEX Nairobi *www.iftex.org*	NAIROBI
08-10	Agrofood Ethiopia *https://www.agrofood-ethiopia.com/*	ADDIS ABABA
15-17	Agritec Africa *https://www.agritecafrica.com/*	NAIROBI
SEPTEMBER		
15-16	Naivasha Horticultural Fair *https://www.naivashahortifair.com/*	NAIVASHA
15-17	TANZFOOD *https://www.tanzfood.com/*	ARUSHA

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AgriTech Expo Zambia to kick off in April this year

AgriTech Expo Zambia is the ultimate trading platform for suppliers in the industry.

Image Credit: AgriTech Expo Zambia

THE EIGHTH EDITION of AgriTech Expo Zambia will take place 20-22 April 2023, hosted at GART Research Centre, Chisamba, Zambia. This high level event remains the largest and most professionally attended agriculture showcase in sub-Saharan Africa. Continuing the partnership between the German Agriculture Society (DLG Agriculture Ltd.) and Zambian National Farmers Union (ZNFU), the aim is to deliver an interactive arena for farmers of all scales, to increase networking capacity, gain better access to market and benefit through direct knowledge sharing. AgriTech Expo Zambia is the epicentre for all things agriculture and is the ultimate trading platform for suppliers in the industry.

Attendees will have the opportunity to network with industry peers, face-time with real buyers, showcase product and service range to a captive audience of farming professionals, meet with government officials and trade agencies, increase business footprint in southern Africa, and find new distributors and agents for products.

The 85,000 sq m exhibition space will host 18,500+ attendees and more than 180 exhibitors. Including 45 training workshops, 33 live crop trials and six international pavilions.

View the brochure at: https://www.agritech-expo.com/specs-brochure

Second Pan-African Poultry Conference to address competitiveness and challenges of the industry

THE REGIONAL CENTRE of Excellence for Poultry Science (CERSA) of the University of Lomé and the World Poultry Science Association (WPSA-Togo branch) are co-organising the second edition of the Pan-African Poultry Conference (PPC), from 16-18 May 2023 in Lome, Togo.

The theme of the Conference this year is 'Competitiveness and inclusiveness of the value chains of the poultry sector in Africa.' It will bring together specialists, industrialists, trainers, and researchers in the field of poultry from various backgrounds to discuss the challenges of poultry production in Africa.

The main themes are environment and poultry production systems; food, nutrition and metabolism; reproduction and incubation; product quality, processing and food safety; and economics of poultry production.

The forum will bring together more than 300 stakeholders in the poultry sector, from several African countries and beyond. The participants will include specialists, industrialists, trainers, and researchers. They will mainly discuss the challenges of poultry production in Africa and define strategies to make the sector more competitive.

The Conference will bring together specialists, industrialists, trainers, and researchers in the sector.

Image Credit: Adobe Stock

CERSA is a centre of excellence that works for food security through the development and promotion of the poultry industry by training professionals, technicians and experts in the field.

The World's Poultry Science Association strives to advance knowledge and understanding of all aspects of poultry science and the poultry industry.

The first edition of the Pan-African Poultry conference was held in in 2019.

Support for Ugandan poultry farmers

FARMS INTERNATIONAL HAS launched a poultry project loan programme in Uganda, according to the organisation's social media and media reports.

The programme will support poultry farmers in producing more eggs and ultimately support them to climb out of poverty.

FARMS International's revolving loan funds ensure loans are recycled so that multiple families are helped with the same investment. This ensures that mission resources are fully utilised and preserved.

The organisation provides loans, technical support for income generating projects, and spiritual training for families.

Combating codling moth

A FORM OF fertility control is being pioneered in Australia to manage codling moth, a major pest to the apple industry.

In an unmanaged orchard, codling moth can wipe out 50-90% of the fruit being grown. To combat it, alongside local apple farmers, researchers at the Tasmanian Institute of Agriculture (TIA) are piloting a controlled sterile insect release programme which has the potential to change the way codling moth is managed.

The programme imports sterilised moths from Canada for release in test orchards which are being monitored using pheromone traps. It represents an environmentally-friendly way of controlling insect pests while reducing fruit damage.

High demand for veterinarians in South Africa

ACCORDING TO A South African Veterinary Association report, economic and safety concerns have influenced the decision of more than 50% of the country's young veterinarians to leave, raising concerns around the sector's ability to meet animal needs.

A fully staffed veterinary service is a critical enabler to a thriving agriculture sector but, according to Western Cape Minister of Agriculture, Ivan Meyer, South Africa is not producing enough veterinarians to meet the country's needs.

"The international norm is between 200 and 400 veterinarians per million of the population – yet currently, there are about 60 to 70 veterinarians per million in South Africa. This represents about 25% of our country's needs. So this is a crisis," commented Meyer.

He further pointed out that the aggravation of the shortage was a result of the country removing veterinarians from the critical skills list, making it harder for international veterinarians to acquire a work visa.

"The shortage of veterinarians puts South Africa's economic prospects, animals and human health at risk", continued Meyer. He stressed that avenues such as occupational specific dispensation (OSD) need to be explored, to create an enabling environment through employment remuneration conditions, thereby stopping and reversing the trend of young veterinarians emigrating.

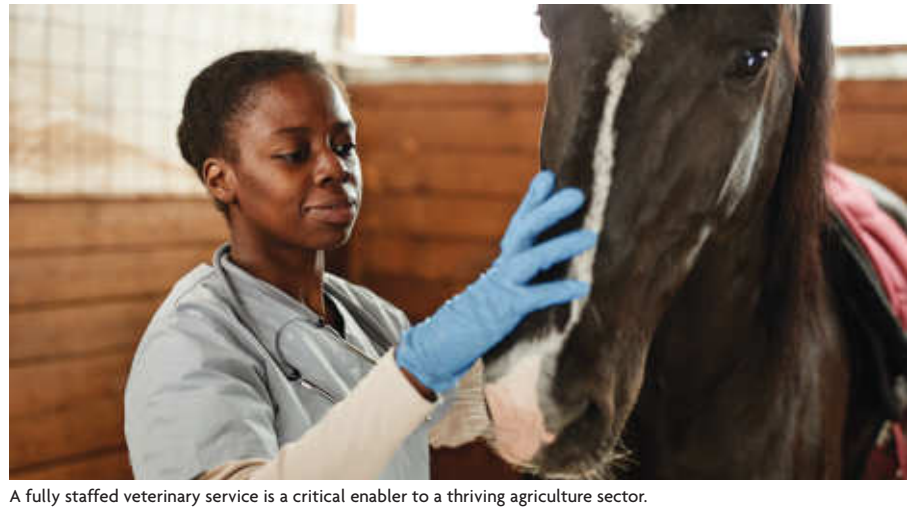

Image Credit: Adobe Stock

A fully staffed veterinary service is a critical enabler to a thriving agriculture sector.

In addition, Meyer also suggested improving young veterinarians' working environment and career prospects to improve the retention of a critical skill required within the agricultural economy.

Meyer announced that he would write to the national Minister of Agriculture, Land Reform and Rural Development to seek urgent intervention as he strongly believes that the country needs a second veterinary training centre, comprising of a commissioned faculty capable of training a large number of veterinarians.

Coastal provinces such as Western Cape, Eastern Cape and KZN are believed to be ideal sites to host a second veterinary faculty. These provinces carry more than half of the country's animal population that could be better serviced and benefit from the research platform created by the new faculty.

Moreover, through this initiative, veterinarian work on aquaculture and marine culture could also receive a massive boost.

DBG works to boost Ghana's agricultural sector

THE DEVELOPMENT BANK of Ghana (DBG) will support the country's agricultural sector by committing itself to ensure the policy environment is production friendly.

As outlined by chief economist, Kwabena Opuni-Frimpong, DBG is keen to identify how certain agricultural policies have impeded the growth of the sector, allowing its advocacy team to employ an effective modus operandi to execute the cause.

"DBG as a thought leader would have to also take up initiatives that support what other partners are doing within the sector. Now if we can help to unlock or solve the policy problem, it affects all of them and it becomes a public good from which everyone will benefit and that is one of the key things that DBG will ensure, that the policy environment is right for the sector to operate more efficiently and productively," he explained.

"Food inflation accounts for the huge rise in the inflation basket. That is why we want to boost the production of foodstuff, especially of our staples which will affect the supply and demand. If we increase the supply, then obviously prices will come down and that would make it easier for ordinary Ghanaians to purchase them."

DBG deputy chief economist, Godwin Kojo Ayenor, explained that the bank has selected four value chain foods (poultry, rice, soybean and maize) as its focus to address the food insecurity threats and noted that the investment in the food chain is DBG's contribution to support the government and private sector in agricultural financing.

Helping women access the US market

THE US EMBASSY has partnered with the American Chamber of Commerce in Madagascar (AmCham) to empower Malagasy women entrepreneurs in the agriculture sector to access US markets. AmCham will host workshops in Antananarivo, Toamasina, and Antsirabe for women leaders of food sector businesses, where they will learn the tools and networking opportunities needed to adapt their business strategies and reach American consumers. They will learn about microfinance institutions and preferential trade opportunities such as the African Growth and Opportunity Act (AGOA). The project is funded by the POWER – Providing Opportunities for Women's Economic Rise – initiative, a programme supported by the US Bureau of Economic and Business Affairs.

Zoetis receives grant for veterinary care and services

ZOETIS HAS RECEIVED a US$15.3mn grant from the Bill & Melinda Gates Foundation to further develop and integrate innovative solutions to advance veterinary care and diagnostic services that will ultimately improve livestock health and productivity in sub-Saharan Africa. The grant will help Zoetis to expand its original African Livestock Productivity and Health Advancement (A.L.P.H.A.) initiative to include aquaculture in addition to cattle, poultry, and swine in an additional seven countries in sub-Saharan Africa. The new five-year initiative aims to improve veterinary health and food security in some of the most rapidly developing regions in the world. It will accelerate access to veterinary products, services and diagnostic tools to increase the productivity of smallholder farms, with a particular focus on supporting female farmers.

Strengthening the role of women in Somalia's maritime sector

IN FEBRUARY, A new national action plan for enhancing and empowering Somali women in their country's maritime sector was launched at a high-level event bringing together senior government officials and representatives from civil society and the international community, including the United Nations (UN)

Speaking at the launch event for the Women in Maritime Sector (WiMS) National Action Plan, Somalia's Deputy Prime Minister, Salah Ahmed Jama, said, "The 'Blue Economy' that we want to exploit includes fisheries from our waters and all the goods that pass through it; we also have to consider the value chain from the fisherman, to the buyer, to the marketer and to the investor. In order to succeed in this venture we need to empower women across the whole value chain."

UN Secretary-General's Deputy Special Representative for Somalia, Anita Kiki Gbeho remarked that the WiMS National Plan would help to ensure that women operating across the maritime domain were provided with increased visibility and opportunities to not only participate in, but also benefit from the sector. The plan marks the culmination of a Somali-led process that began in September 2019, with coordination and support from the UN Assistance Mission in Somalia (UNSOM) and the European Union Capacity Building Mission in Somalia (EUCAP Somalia).

Moreover, given the critical shortage of maritime skills that exist due to the lack of educational and institutional capacity, the plan also helps to collectively develop women's needs and priorities in the maritime sector, within both the private sector and government institutions.

Gbeho further emphasised that it was now crucial to transform the Action Plan into projects that could be supported with technical and financial assistance. In this respect, she encouraged UN agencies such as the UN Office on Drugs and Crime (UNODC), the UN Industrial Development Organisation (UNIDO), the UN Environment Programme (UNEP), the International Labour Organisation (ILO) and the Food and Agriculture Organisation (FAO) to continue their support.

"Opportunities are limitless in the maritime domain. With its vast coastline, Somalia's 'Blue Economy' could be at the forefront of delivering change and generating wealth for Somalia's women and, indeed, for the nation," added Gbeho, who also serves as officer-in-charge of the UNSOM.

Image Credit: Adobe Stock

Somalia is looking to enhance the role of women in the country's blue economy.

Biodiversity is key to sustainable agrifood systems in Zimbabwe

ZIMBABWE IS NOT spared from the global ecological, economic and social shocks affecting agriculture, and agroecology is a panacea to transform and drive sustainable agrifood systems.

The agenda to mainstream biodiversity in agriculture seeks to balance the interactions between plants, animals, humans and the environment, while also advancing the need for socially equitable food systems within which people can exercise choice over what they eat, how and where it is produced.

through the Ministries responsible for Agriculture and Environment, the Government of Zimbabwe convened a one-day coordination workshop to evaluate, learn and develop integrated approaches to mainstream biodiversity into agriculture. More than 40 experts attended the meeting from the agriculture and environment sectors, drawn in the context of strengthening the National Agriculture Policy Framework (NAPF) pillar eight (8) and the National Biodiversity Forum (NBF) to coordinate the implementation of climate-smart and ecosystem-based agricultural practices.

The FAO presented a preliminary inventory and status of agroecology implementation in Zimbabwe.

"The meeting provided an opportunity for participants to deliberate, collaborate and take collective action towards better food systems and implementation of multilateral environmental instruments to realise a better future for our country," said Andrew Mushita, executive director for the Community Technology Development Organisation.

Florian Blevin, regional technical & commercial manager, SSA, discusses why the Ross 308 is the broiler of choice in this continuously growing and dynamic region.

Ross 308 – The Broiler of Choice in Sub-Saharan Africa

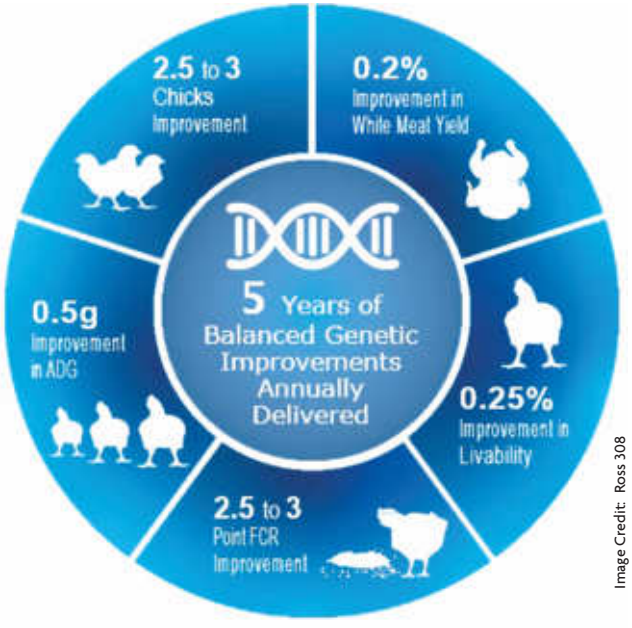

Image Credit: Ross 308

Figures above are annual and based on one million broilers per week at a kill weight of 1.8 kg.

In your opinion, why should customers in the SSA region choose to buy Ross?

The Ross 308 satisfies the demands of customers who require a bird that performs consistently well and has the versatility, robustness and cardiovascular strength to meet a broad range of end-product requirements and environments. The Ross 308 is the leading broiler worldwide, with its unparalleled and renowned performance in both open and closed-housing environments. Our customers across the SSA region choose Ross because it meets the requirements they are looking for in a bird, specifically in FCR and yield, which in turn maximises their profit and provides the customer with the best return on their investment.

Can you tell us a little more about the advantages of the Ross breed?

The Ross 308 has advantages in both breeder and broiler performance. For example, the Ross 308 breeder is performing exceptionally well, steady gains in hatching egg (HE) output, and hatchability have delivered on average an additional 15–20 chicks over the competitor and in some cases the difference is even greater. This means that a customer processing one million broilers a week requires 35,000 less parent stock to produce the same number of broilers. This also means that less breeder feed is required. If we check the numbers, it would mean 2,000 tonnes less breeder feed equates to a saving of approximately US$900,000 on feed alone.

Faster growth rate, better livability and carcass yield deliver the most meat per kg at the lowest cost of production. Based on on TMEA field results, the Ross 308 broiler performance shows a minimum of:

- **1% better FCR:** equating to a savings of US$415,000
- **1% better livability:** equating to a savings of US$482,000
- **0.2% better eviscerated yield:** equating to an additional profit of US$200,000

The Ross 308 exhibits unparalleled and renowned performance in both open and closed-housing environments.

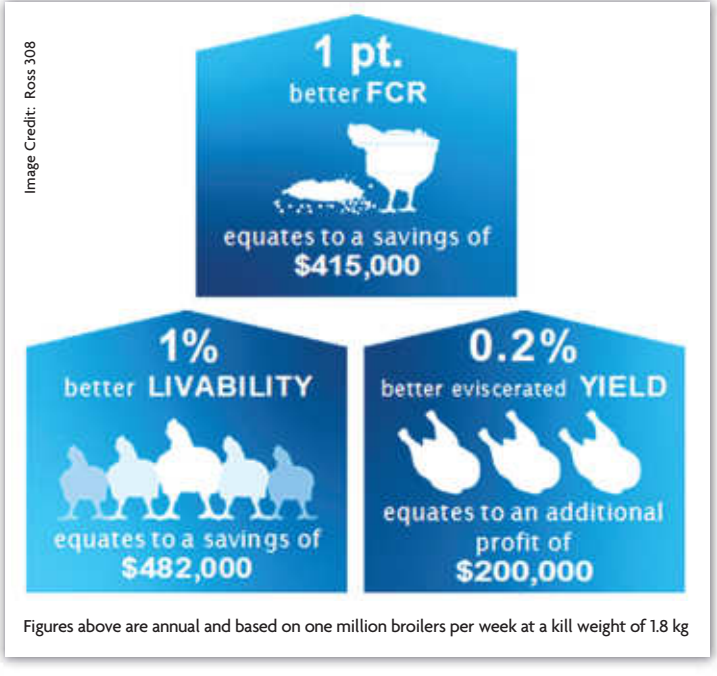

Image Credit: Ross 308

Figures above are annual and based on one million broilers per week at a kill weight of 1.8 kg

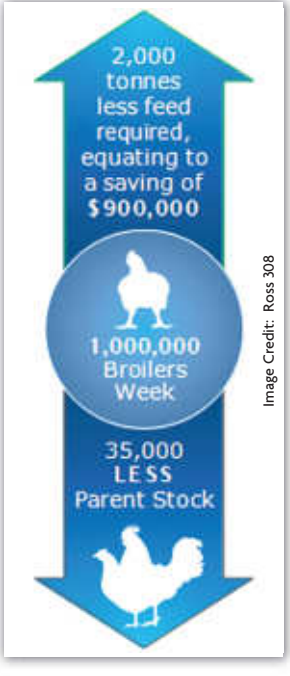

Image Credit: Ross 308

How do you and your team support your customers across the region?

We have a very talented multi-cultural customer support team who live and work in the region, and also speak the local language. We also have the support of International Specialists and the Aviagen R&D department so our customers can have confidence in the Ross brand.

Ross provides the best literature portfolio which includes parent stock and broiler management handbooks, performance objectives and nutrition specifications, which are all available on the Aviagen website. Aviagen also has a global flock management app for Ross customers. The app offers quick and easy access to PS and broiler data, along with useful reference and monitoring tools, such as an EPEF calculator and a scoring tool. In addition to this, we also have a podcast series "The Eggspert View", which provides information on our key technical topics and key information from around the region.

African NGOs are urging poultry producers to embrace cage-free housing systems to promote the health and wellbeing of laying hens.

Lower constraints for higher performance

AFRICA'S GROWING POPULATION and demand for animal protein has resulted in a boom in the continent's poultry business. As we are aware, poultry production and welfare go hand in hand. This is why a majority of producers are now shifting their focus to cage-free housing systems to promote the welfare of layer hens.

Battery cages, also known as conventional cages have so far been the most commonly used housing systems designed to raise laying hens. While some poultry producers argue that battery cages increase production by conserving chickens' energy, several African NGOs have began calling for a ban of battery cages as it is not only considered cruel, but also unhygienic, thus increasing the likelihood of spreading harmful germs to humans.

Image Credit: Adobe Stock

Layer hens in cage-free systems exhibit lower levels of stress, given their ability to express innate behaviours such as laying eggs in discreetly built nests.

Advantages of cage-free housing systems

Unlike battery and furnished cages, raising layer chickens in cage-free poultry houses have a plethora of advantages:

- Hens in cage-free systems experience better musculoskeletal health and are found to have stronger wings and keel bones, when compared to hens in conventional and furnished caging systems.

Image Credit: Adobe Stock

Each caged laying hen is afforded only about 67 sq in of cage space, preventing them from even spreading their wings.

- The risk of infectious diseases is significantly lower in cage-free systems, with the adoption of proactive approaches such as biosecurity and vaccination programmes.
- Cage-free systems offer chickens enough space for locomotion and basic movement, thus reducing the incidence of non-infectious diseases such as fatty liver and disuse osteoporosis, that are often associated with lack of movement and exercise.
- Layer hens in cage-free systems exhibit lower levels of stress, given their ability express innate behaviours such as laying eggs in discreetly built nests.
- Cage-free systems have the ability to provide adequate materials to facilitate dustbathing, an essential activity that helps remove skin parasites, regulate the amount of feather lipids, and maintain plumage condition.

"Managing layers in cage-free housing systems requires a focus on meeting the birds' physical and behavioural needs."

Managing layers in cage free housing systems

Managing laying hens in cage-free housing systems requires attention to detail and a focus on meeting the birds' physical and behavioural needs. Dutch company Hortaco Agri, has developed a number of control systems that allow efficient management of cage-free hens, thereby maximising laying performance.

- **Fortica automation system:** This is an extremely user-friendly and universal poultry automation system that enables egg producers to train layers through smart feeding, watering and lighting regimes.
- **Egg Flow Control:** This is a unique system that saves production costs by providing a smooth, continuous egg flow from the layer house to the packing point.
- **EggXact:** Hortico's new egg counter comes with a new shape and communication system for extreme reliability and durability, which offers real-time insight into the egg production of layers, thereby allowing egg producers to react faster to changing conditions in the house and regulating egg flow more quickly.

RFID technology is another efficient method used for tracking layer movement in cage-free environments using RFID-based tracking systems which enable egg producers to easily locate hens in multi-tier cage-free systems.

The poultry sector of SSA's agriculture industry is at risk of feed insecurity and safety as outbreaks of mycotoxins in the feed are causing severe health complications and higher mortality rates.

Detoxifying mycotoxins in poultry feed

THE POULTRY SECTOR of sub-Saharan Africa's agriculture is essential to the economic impact the industry has on the overall regional economy. However, the sector is faced with feed insecurity and feed safety in the wake of mycotoxin contaminations within the livestock feed.

Mycotoxins are toxic compounds which naturally produce certain types of fungi in numerous types of food supplies. The mycotoxins are chemically stable and can occur before or after harvest and during storage, where they grow on or within the feed under humid conditions. Among the most poisonous of the mycotoxins are the aflatoxins (AFs) – the most present mycotoxin in the Tropics – which grow in soil, decaying vegetation, hay and grains, as well as in the milk of animals which have eaten the contaminated feed.

Image Credit: Adobe Stock

It's not only poultry that can be affected by the toxins, but humans can also experience severe health risks when exposed to large quantities of mycotoxins.

Affected poultry products

Large doses of the toxins can be detrimental to not only poultry health, but to humans as well. Increased exposure to contaminated feed can lead to life-threatening acute poisoning (aflatoxicosis) of the liver, as well as potentially damaging livestock DNA and causing cancer. The toxins also have an effect on the bird performance by reducing egg production numbers, thus enhancing economic losses across the industry.

Mycotoxins also bestow immunosuppressive effects onto the birds and have been shown to reduce disease resistance as well as reduce drug efficiency, leading to the birds becoming more susceptible to different types of diseases, as well as accelerating mortality numbers.

Relating back to the economic losses the industry is facing in wake the of mycotoxin outbreaks, farmers are having to incur costs associated with treatment for their livestock, as well as the overall loss that comes with higher mortalities. Stunted growth can be attributed to contaminated feeds also, resulting in more money having to be spent on increased feed to attain the poultry desired weight, as well as valuable time lost trying to catch that weight up.

The immunosuppressive effects of mycotoxins have been shown to reduce disease resistence and drug efficiency, leading to accelerating mortality numbers.

Looking at the effects mycotoxins can have on humans, feeding the contaminated grains to the birds can lead to the retention of aflatoxins in the poultry tissue, which can constitute to a major public health risk when humans consume any of the poultry products, including meat, eggs and liver. There is evidence to suggest that prolonged exposure to large doses of mycotoxins can cause serious issues harm to humans, including, in the most serious instances, liver cancer.

Tropical countries, including Nigeria, Ghana, Kenya and Uganda, have experienced AF levels in feed products well above the EU regulatory limit of 20 μg/kg. The main source of high AF

occurrences is within oilseeds, especially peanut and sunflower. According to the Toxins journal, Benin, Cameroon, Ethiopia and Nigeria reported more than 60% of peanuts had high levels of AFs of up to 11,900 µg/kg, and in Malawi, Uganda and Ethiopia, all maize samples recorded were contaminated with AFs at the maximum level of 150 µg/kg.

Outbreaks in feed, like the aforementioned maize, has reportedly been the cause of death for large numbers of poultry across Kenya and Morocco, with three different outbreaks having occurred in Kenya on separate occasions.

Detoxifying the toxins

In an effort to detoxify poultry feeds contaminated by aflatoxins and prevent outbreaks, a study conducted in the Journal of Applied Poultry Research tested the effects of activated charcoal, bentonite and fuller's earth. These absorbents prove more cost effective than the likes of mycofix, aluminosilicates and esterified glucomannan; all of which have successfully bound mycotoxins and stopped them from absorbing into the poultry's digestive system, however, they are inaccessible to economically-challenged farmers.

Utilising locally available absorbents is imperative in combating the outbreaks relating to mycotoxins. The study found that out of the three locally produced absorbents, bentonite proved most effective in preventing diseases related to toxin-absorption within the poultry tissue, compared to activated charcoal and fuller's earth. In countries like Nigeria, Kenya and Tanzania, the Toxins journal states that one of the most prominantly used absorbents used is that of commercial clay-based mycotoxin binders, which have been imported by feed processors for use in the feed formulas. However, there is little evidence to monitor the safety and efficiency of these methods, in SSA countries, but the commercial binders have proven to protect broiler chickens from the toxic effects.

Utilising locally available absorbents is imperative in combatting the outbreaks relating to mycotoxins.

Locally-based commercial binders are the most popular method of detoxifying feeds contaminated with mycotoxins in SSA countries.

Other options to limiting the high contraction of mycotoxins is to dry cereal products prior to storage to reduce the high humidity factor the toxins mutate in, and introducing certain types of bacteria into the feed which consume mycotoxins in the gut of the poultry.

Fortified kraals could provide the solution to securely housing livestock and protecting them against predators. Minhaj Zia reports.

Housing livestock against carnivorous predators

Image Credit: Adobe Stock

Lions accounted for 12% of the livestock killed in nearby conservancy areas.

AS FARMERS LOOK into solutions to maintain livestock for their business growth, the battle against carnivorous predators could hamper their progress. Although loss from livestock depredation is typically small in reference to livestock numbers, with high losses coming as the result of disease, theft or drought, its impact can vary locally with the most significant impact being felt by small communities which are dependent on raising livestock.

To combat this, preventative measures can be taken to ensure the protection of livestock from carnivore attacks. One strategy which has been used globally is the confinement of livestock at night in an enclosed area specifically designed to be fortified against predators. Referred to as 'kraals' (also known as pens, paddocks or corrals), these structures are used to contain livestock in an area at night.

Traditional kraals offer little to no protection against free roaming predators as they are typically used for containment, which is why fortification is necessary to deter potential attacks. This can be as simple as making use of locally available materials such as stone and thorn bush to form walls around the fortification. Wooden poles can be set very closely together and then wrapped with wire or twine. Alternatively, more sophisticated structures could involve electrified walls, although this would of course bring costs up.

Indeed, fortified kraals are proven to be a highly effective strategy, bringing time spent supervising livestock down while also dramatically reducing livestock losses at night by more than 90% in Africa's communal areas, sometimes even completely eliminating livestock predation all together. Kraal usage does however, require some form of maintenance to ensure the structure maintains its effectiveness. ScienceDirect reported, "Fortified kraals built by non-governmental organisations cost US$1322.36 per unit and mitigated a mean annual loss of US$187.32. This suggests cost-recuperation after 7 years, or 2.3 times longer than observed kraal lifetime. Conversely, owner-built replicates cost US$579.90 per unit, recuperating investment after 3.1 years."

"Fortified kraals built by non-governmental organisations cost US$1322.36 per unit and mitigated a mean annual loss of US$187.32."

In Zimbabwe, lion and hyena attacks on livestock have been has been a detriment to the villagers of the region. Most rural households make use of non-fortified kraals which can only contain livestock, offering no protection from external threats. One of the victims, Annai Makuyana, said, "Since 2017, I lost 13 of my cows and 21 goats. They [hyenas and lions] used to attack even in the presence of the herders in the grazing areas and I am now left with only five cows and three goats because they were being attacked even inside their kraals," speaking to The Standard in Zimbabwe.

Makuyana is one of several villagers around the region who are now turning to fortified kraals to remedy livestock predation. This is the preferred method by conservationists to promote the coexistence of livestock with free-ranging predators in wildlife corridors.

According to the Gonarezhou Conservation Trust (GCT), an organisation which runs the Gonarezhou National Park, spotted hyenas made up 41% of the fatal attacks on livestock in the bordering areas of the game reserve, including nearby conservancy areas such as Malipati, Mapfuka and Jamanda in 2021. Lions and hyenas constituted 12% and 14% respectively of the livestock killed by carnivores (other examples include crocodiles which also accounted for 14%).

That same year, the GCT launched a programme to detect areas

with the most frequent attacks and then work closely with the communities to put up fortified kraals and monitor the outcomes. Several kraals had been improved into fortified kraals since the start of the project, which significantly reduced predator attacks on livestock by 90%.

Lexon Makondo, a headman in Mhlanguleni village and one of the villagers part of the fortified kraals project, said, "We were advised by the GCT to adopt and invest in predator-proof kraals made up of wooden poles. I managed to save money and bought the poles for 10 South African rand (US$0.54) each and with their supervision I managed to set up a kraal that does not leave any spacing in between for these wild animals to encroach.

"Since the construction of the kraal, none of my cattle has been killed while inside the kraal." He noted the rising attacks by lions and hyenas on livestock in his village, necessitating the adoption of effective countermeasures. With the success that fortified kraals have brought, their attention turned towards developing additional protection for livestock during the day time.

Similar efforts are being made in Namibia, where farmers have also reported several attacks by lions on livestock and damaging their property. "The lions kill our livestock as some of our traditional kraal structures are not strong enough. It is painful losing cattle, and to date, I have lost count," said Josefina Samukolofu, a farmer from Sangwali in Wuparo conservancy in the Zambezi region, as reported by Xinhua.

A joint project by the Kwando Carnivore Project and the Community Conservation Fund of Namibia in the Ministry of Environment, Forestry and Tourism launched a project to build 30 lion-proof kraals with an approximate US$87,304 fund to help alleviate the issue. Under the project, more than 10 lion-proof kraals were built with more set for completion by August 2022, with areas focusing on Mashi, Sobbe, Wuparo, Dzoti and Balyerwa. While farmers provide the poles for construction, the Kwando Carnivore project and the conservancy provide the necessary training, skilled labour, fencing and equipment.

"Since the construction of the kraal, none of my cattle has been killed while inside the kraal."

"The new kraals are securer because the poles are strong and are netted together differently with wires. We are now better off knowing the livestock is safe from lion attacks because we have the protection of the fenced-off kraals," Samukolofu added. "Though we have lost cattle to lions, the lion-proof kraals means a second chance to rebuilding and our cattle to multiply in numbers."

Seeing as fortified kraals have been proven to reduce predator attacks on livestock, it is highly likely the results produced will be positive for the farmers in the region. It is also in line with the project's vision to impact the country's conservation efforts for all wildlife, not just domestic.

Botswana on the other hand, have taken further steps towards livestock housing where authorities have established the world's first electrified livestock enclosure in Eretsha, a small village. The programme was launched by Communities Living Among Wildlife Sustainability (CLAWS) Conservancy in order to aid farmers who have no choice but to sell their cattle at a fraction of the market value due to uncontrolled grazing patterns where cattle could pick up diseases such as Foot and Mouth Disease from mingling with Cape buffalos.

Solutions like fortified kraals provide farmers and villagers with the knowledge that their livestock can remain protected at night time when predators are more likely to attack. The easy access to materials and simplicity in design allows for it to be used widely across the African continent by those who are looking for resolutions towards livestock housing and predation.

With support from conservation organisations in establishing fortified kraals for villagers and farmers, it could help sustain small communities in the African continent and allow them to flourish.

Image Credit: Adobe Stock

An unfortified kraal is not suitable for protection against lions and hyenas.

Fractions obtained by maize processing are further processed into a wide range of maize products, often used as base ingredients for food and non-food products, Dr Terry Mabbett reports.

Processing maize into food products


Image Credit: Adobe Stock

Maize flour can be pre-gelatinised and used in compounding high nutrient mixes like corn-soy-milk and corn-soy-blend.

INDUSTRIAL UTILISATION OF maize can be conveniently broken down into wet milling and dry milling. Maize processing essentially separates the grain into germ, hull and endosperm components. These fractions are further processed into a wide range of maize products used as base ingredients for food and non-food functions.

Wet milling

Main maize food products sourced from the wet milling industry are corn starch, corn syrup, high fructose syrup, dextrose and corn oil, and various by-products used for livestock feed.

Corn starch is an increasingly important product mainly utilised in the thickening and stabilisation of other ingredients. Many different forms and types of corn starch can be produced, each best suited for a particular function in the food manufacturing industry. For instance corn starch products are required in the manufacture of baking powder, prepared mixes, candies, baking goods and puddings. Highest use of corn syrup is in the confectionery industry, followed by baking and dairy product manufacture.

High fructose corn syrup is used in a broad range of food manufacturing industries including confectionery baking, non-alcoholic sweet beverages, condiments (ketchup and pickles) and syrups. Biggest single use for maize dextrose is in baking where it is utilised as nutrient for yeast fermentation, as a sweetener and for pastry crust browning. Other significant users of dextrose are confectionery manufacturers, canning and frozen food industries and the beverage industry, both alcoholic and non-alcoholic. Corn oil is used for production of salad/cooking oils and margarine.

"The endosperm fractions generated during dry milling are characterised and classified by the dimensions and size distributions of their particles."

Dry milling

The main maize products derived from dry milling are maize meal, flour and maize grits, along with maize oil and various by-products used for animal feed. The endosperm fractions generated during dry milling are characterised and classified by the dimensions and size distributions of their particles. These determine composition and therefore potential use.

Characterisations and classifications are:

- Grit fractions (1.2-0.6 mm) used for many different types of food both traditional and commercial including imitation rice (Senegal, Nigeria) and corn flakes worldwide. Brewer's grits are used in beer production.
- Maize meal (0.6-0.2 mm) is commonly used in meal mixes, maize bread, maize muffins and some extruded maize snack products.
- Maize flour (< 0.2 mm) is a widely used and sought after ingredient for pancake mixes, baby foods, cookies, biscuits, ice cream cones, ready-to-eat cereals, batter breading mixes, and binders for loaf-type sandwich meats. Maize flour can be pre-gelatinised and used in compounding high nutrient mixes like corn-soy-milk and corn-soy-blend.

Maize for food at village level

All that said about industrial processing and utilisation of maize, much of this mainstay cereal staple is still processed at village level. From its freshly harvested raw state, maize grain can be parched, baked, roasted, boiled or steamed while still on the cob, or dried and traditionally dry milled for production of maize flour. Common food products made from ground maize grain at village level throughout Africa are cooked paste or mush eaten while still warm, and a thick beer of low alcoholic content. Chunks of the paste or mush are broken off and dipped into stews or sauces of meat, fish or vegetables before eating. In some areas, maize mush is fried or baked.

"From its freshly harvested raw state, maize grain can be parched, baked, roasted, boiled or steamed while still on the cob, or dried and traditionally dry milled for production of maize flour."

Image Credit: Omex

Maize from field to factory.

A huge range of maize dishes is consumed on a large scale throughout tropical Africa. It includes: maize fritters, whole maize cooked with beans, fermented and flavoured maize starch, parched or popped maize, dehydrated immature maize boiled just prior to eating, thin maize mush, maize gruel, flavoured weak maize beer, and distilled maize drinks. Each and every country has at least one maize dish which is unique and vital to its culture and the nutrition of its people and for which it is famous.

For instance: Ogi (Nigeria), Kenkey (Ghana), Koga (Cameroon), Tô (Mali), Injera (Ethiopia) and Ugali (Kenya). Most of these products are still traditionally processed.

Certis Belchim's product, Eradicoat T has successfully been developed and evaluated for use against FAW in several African and Asian countries.

Protecting maize against Fall Army Worm using Eradicoat T technology

THE FALL ARMY Worm or FAW (Spodoptera frugiperda), a native of tropical regions, feeds on the leaves and stems of a wide variety of plant species. It causes major damage to important crops like maize, rice, sorghum, sugar cane, soya, vegetables and cotton, resulting in a severely detrimental effect on yields. Since its arrival in Africa in 2016 from the Americas, FAW has come to present a major threat to food security globally.

Its rapid expansion across the globe has required the development of effective, sustainable control solutions, even more important in the light of recent fears of the formation of one intercontinental 'super-population' of FAW, which increases the chance that insecticide resistance could spread quickly.

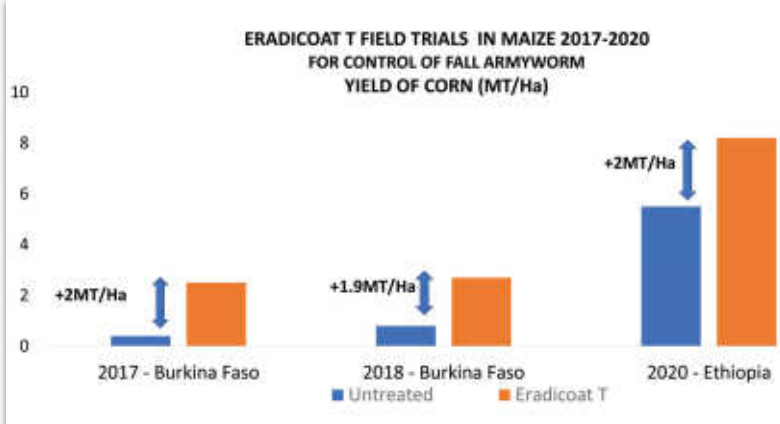

Image Credit: Certis Belchim

Eradicoat field trials for maize (2017-2020).

Using maize to protect maize

Certis Belchim has long been committed to the development of sustainable solutions for farmers and growers in Europe and beyond. Its product, Eradicoat T has successfully been developed and evaluated for use against FAW in several African and Asian countries. Based on the natural substance maltodextrin, a starch derived from maize, Eradicoat T uses maize to protect maize. It is formulated with natural, plant-derived oils and water in a water-soluble concentrate formulation. With a broad spectrum of activity, it is effective against a range of pests including Army Worms, Spider mites, Whiteflies, Thrips, Aphids and Mealy bugs on various crops (maize, cotton, cocoa, vegetables and fruits).

Removing the risk of resistance development

The development of resistance is already proving to be a major issue in FAW control and poses a serious threat to maize production and food security. Eradicoat T offers an invaluable solution in terms of resistance management: its 100% physical mode of action (MoA) completely removes the risk of target pests developing resistance. The natural and non-GMO ingredients used to formulate Eradicoat T ensure that the product has several other intrinsic advantages: no residues in the plant, no phytotoxicity, no pre-harvest interval and, with no toxic effect, is safe for end users and consumers.

As a physical-acting insecticide, it coats and dries on the target pest, thus blocking the spiracles and leading to quick knock-down and death by suffocation. Using a second MoA it also immobilises its targets, causing death from starvation and exhaustion. With this double MoA, while being 'soft' on plants and gentle to auxiliary fauna, Eradicoat T is the ideal 'high-tech' solution to be used alone or integrated as a partner with other biological and chemical controls in Integrated Pest Management programmes.

"Based on the natural substance maltodextrin, a starch derived from maize, Eradicoat T uses maize to protect maize."

Development work

In the African region, trials were conducted in Ghana and Ethiopia in a collaboration between ADVANCE (USAID), Positive Agro Solutions and the Ethiopian Institute of Agricultural Research (EIAR) on demo fields and model farms from 2017-2020 and results submitted to CABI by the CSIR - Savanna Agricultural Research Institute. The product has now been registered against FAW in Ghana and Ethiopia, and also registered in various crops in Burkina Faso and Morocco. It is being distributed locally to growers in these countries. Our latest development and results indicate that protecting maize with Eradicoat T, significantly reduces FAW damage and increases yields of maize by more than 100% over the untreated control, with a commensurate growth in income.

Eradicoat T is at the leading-edge of developments in sustainable technology, proven to be very effective in controlling both the first and second instar stages of Spodoptera frugiperda larvae, while ensuring high dry gain yield and quality of produced maize.

In other countries trials and registration are ongoing and it is anticipated that Eradicoat T will be approved swiftly to enable farmers to protect their maize crops and their livelihoods.

Sustainable and effective - Eradicoat T

Eradicoat T is proving to have great efficacy against FAW as a safe and environmentally friendly biorational product. It is a valuable tool in resistance management for growers offering proven efficacy on a broad spectrum of crops and competing effectively with conventional chemicals. With minimum impact on beneficials, gentle effect on natural processes and no residues, it has zero days harvest interval and zero days re-entry period, giving the product very strong advantages. Quick knock down, quick kill and no risk of resistance development complete Eradicoat T's credentials as the perfect partner for use alone or in an IPM programme.

For more information, visit: www.certisbelchim.com

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Where practicable, cotton farmers should invest in two knapsack sprayers, one for insecticides and fungicides and the other for herbicides, Dr. Terry reports.

Cotton pests require control from the very start

GROWING COTTON CAN come at a high price in money and the hard work involved in defending crops from an interminable list of insect pests. A wide range of insect types and species attack in sequence from the moment the cotton seed is sown until the cotton lint is safely gathered in. Cotton crops are so 'pestered' by insects that farmers essentially need to have a sprayer charged with insecticide, primed and ready to go, from the very moment when the new cotton seedlings push through the soil.

Where practicable cotton farmers should invest in two knapsack sprayers, one for insecticides and fungicides and the other for herbicides, because with all the care in the world, including thorough sprayer cleaning, accidents can and do happen. The price paid for applying an insecticide spray to cotton plants using a spray machine that contains herbicide residue can be very costly indeed.

Those farmers preferring to use hand-held spinning-disk (CDA – controlled droplet application) sprayers will automatically have separate applicators for insecticides/fungicides and herbicides. That will be a fast-spinning, small-droplet atomiser for CDA (controlled droplet application) treatment of cotton with insecticides and fungicides and a slow-spinning, large-droplet atomiser for safe, minimum-drift application of herbicides by controlled droplet application.

Farmers may not even see the first insect pests which attack cotton. These will be cutworms and so called because they feed on the soft cotton stem which is severed at ground level to cause collapse of the plant. They are soil-inhabiting larvae of particular moth species that spend daylight hours curled up in the ground near the cotton plant roots and then coming out during the hours of darkness to feed.

Cutworms feed on a wide range of plants including both crops and weed species. 'Dedicated' cutworm species include Agrotis ypsilon (black or greasy cutworm) although the larvae of moth species more usually associated with leaf damage (e.g Spodoptera sp, the lesser armyworm and cotton leaf worm) will occasionally behave as cutworms. Cutworm damage often goes unnoticed until it becomes severe, by which time the cutworms are older, bigger and notoriously difficult to kill with sprays of insecticide.

The best approach to management of cutworms in cotton is to clean-weed the field before sowing, because many of these moths prefer to oviposit (lay eggs) on weeds, and to then spray insecticide at the first sign of plant damage. Drench the rows of young cotton plants using a medium/coarse droplet (large nozzle) to deliver a high volume spray of an appropriate broad-spectrum insecticide and which is well established for control of a wide range of soil-dwelling insect pests.

"The best approach to management of cutworms in cotton is to clean-weed the field before sowing, and to then spray insecticide at the first sign of plant damage."

Ripe bolls split to reveal the white lint, the reward for well-fed and well-managed cotton.

Image Credit: Omex

The classic early-season insect pests of cotton are the so-called sucking pests comprising a range of sap-sucking bugs which include the cotton aphid (Aphis gossypii), cotton jassids (Amrasca sp), cotton leaf thrips (Thrips and Caliothrips), cotton whitefly (Bemisia tabaci), mirids (Lygus sp) and the mosquito bug (Helopeltis).

The speed with which this spectrum of insect pests attack cotton, and the damage caused to plants, will depend on a number of factors. These include

- prevalence of weeds which may act as alternative hosts for the insect pest in question,
- presence of other crops which can support a particular pest, tobacco and cassava for instance in the case of whiteflies
- soil water relations and the rapidity with which the seedling can grow into a well-established young plant with a self-sustaining canopy of leaves
- frequency and intensity of rainfall which has a controlling effect on some of these pests by washing insects off of the leaves or embalming insects with mud splashed up from the soil during heavy rainfall

As such cotton plants may need protecting against these pests just days after emergence (at the same time as for cutworms), or after several weeks when the plants are already tall and bushy and approaching the 'squaring' or flower bud formation phase. Failure to act promptly against sucking pests can lead to an early and complete loss of the crop. A relatively small number of sucking pest insects on very small plants can do sufficient damage to kill plants, especially if the ground is dry and the plants can't grow sufficiently quickly. This threat is particularly acute in the case of cotton jassids

because theses insects inject a toxin into the leaf as they feed.

Sucking pests such as aphids, thrips, jassids and whiteflies tend to congregate and feed on the undersides of leaves, and for good reason. It is here that they have easy access to the raised leaf veins with their sharp mouth-parts and where they are better protected from hot sun and the washing-off effect of heavy rainfall. But this under-leaf position can work to a disadvantage for sessile insects like aphids in colonies near to the soil. Heavy rainfall splashes up mud, which embalms the insects and provides as effective control as any insecticide. Thrips pupate in the soil and a good shower of rain can seal the insects in the soil and thereby offer significant natural control.

Distribution of sucking pests on cotton plants may be affected and governed by nutrient status of the leaves at various stages of growth and development. For instance, cotton aphids are invariably found feeding on the youngest leaves because it is these leaves which provide the richest source of soluble and available nutrients for these sucking insects. Likewise the distribution of jassids appears to be influenced by the ratio of carbon to nitrogen within individual leaves up the stem of the cotton plant, as determined by their stage of growth and development and reflected in their relative position on the stem.

Applications of contact insecticide using knapsack sprayers may give disappointing results against many sucking pests because these sprayers, fitted with hollow-cone nozzles and held in the standard mode, will deposit most spray on the upper leaf surface, while the insects like aphids and whitefly larvae are on the under-surface. Better results are achieved against jassids because both adults and nymphs, while staying on the under surface during the day, run around on the upper surface at night where they pick up contact insecticide.

This problem can be overcome by always spraying up and into the cotton plant by holding the lance in such a way that the nozzle is projected upwards into the leaf canopy. Alternatively growers should use a systemic insecticide which enters the leaves and poisons the pests as they feed.

The other option is to use a knapsack mistblower, an applicator not widely used for spraying insecticides to cotton in Africa but extensively used in Asia on the Indian sub-continent and in South East Asia and with good effect. The leading edge of the air blast, which reaches the leaves momentarily before the spray, flips the leaves to expose their underside to incoming spray.

Bollworm pests such the African cotton bollworm and spiny/spotted bollworms (Earias sp) are regarded as mid-season insect pests and during the cotton plant's reproductive period (45 days onwards) when the plants are bearing fruiting bodies in the form of flower buds (squares), open flowers and bolls. That said both of these insect pests, which are the larval stage of moths, can in certain circumstances attack very young plants. They do considerable damage by either severing the growing point (Helicoverpa) or boring into the shoot tip (Earias).

Plants are not killed, but the damage thus caused destroys the ability of affected plants to develop a normal shape. This will in turn affect the ability of farmers to move easily and comfortably up and down the rows. Be that as it may, the real onslaught from bollworms comes later in the day when cotton flowers and fruits (bolls) are in abundance, but that is another story.

"Distribution of sucking pests on cotton plants may be affected and governed by nutrient status of the leaves at various stages of growth and development."

Close up on cotton at the flower bud formation (squaring) stage of development.

Image Credit: Dr Roderick Robinson

Safety considerations

Any use of chemical pesticides must consider all the safety implications and not only those related to safety, health and well-being of spray operators. It must include anyone else who may come into contact with chemical pesticide and its residue while working in the cotton crop or handling the harvested lint. And of course there are even broader considerations about protecting and maintaining environmental integrity. However, one safety aspect which is frequently overlooked is how the inappropriate use of a chemical insecticide can actually make a pest situation worse rather than better. This may come about from using the incorrect dose of

insecticide or applying a pesticide more frequently than is stipulated in the label recommendations. Such actions can actually aggravate an existing insect pest situation or even create a 'new' one. For instance, over-use of insecticides has frequently led to pest resistance to a specific chemical or chemical grouping caused by development of a pest population which becomes insensitive (resistant) to that mode of chemical action. This has occurred with

Image Credit: Micron Sprayers

Spraying cotton with hand-held spinning-disk (CDA-controlled droplet application) sprayer in West Africa.

Damage to cotton bolls caused by the cotton bollworm (Helicoverpa armigera) is shown here.

Image Credit: Micron Sprayers

a number of different cotton bollworm pest species over many years, with insects developing resistance to a number of insecticide chemical groupings including the organochlorines, organophosphates, carbamates and synthetic pyrethroids.

In addition there have been instances where the use of chemical insecticide has impacted on non-target arthropods which themselves are natural enemies of a potential insect pest of cotton. One such example is the impact of synthetic pyrethroid insecticides (commonly used to control bollworms) on natural enemies of the cotton whitely. Net result can be a rapid rise in the population of cotton whitely, and which quickly assumes serious pest status where none existed before. This is an example of a so-called 'secondary pest explosion'. Ⓑ

Eritrean Ministry of Agriculture reviews Seed Policy document issued in 2002

THE PRODUCTION OF quality seed features is a key factor in any policy to achieve food and nutrition security, which is among the primary goals of the government of Eritrea. In order to promote the achievement of national food security, the State of Eritrea issued a Seed Policy document in 2002, which provided effective strategic direction to develop the formal seed sector in Eritrea.

According to Tekleab Misghina, Director General of RSD, the Seed Policy document has undergone a lot of changes over the past 20 years, thereby necessitating the review of the policy document. For instance, new entities such as the Regulatory Services Department of the MoA and the Hamelmalo Agriculture College (HAC) came into being. These changes brought new experiences and knowledge to the formal seed sector.

The National Variety Release Committee, whose establishment envisaged in the Seed Policy document of 2002, was operational for about 10 years now, with lots of experiences accumulated so far. Tekleab went on to say that considerable progress had been made in crop research to develop new varieties and distribute them to farmers through the extension system which further strengthened the formal seed sector. These

Image Credit: Adobe Stock

According to Tekleab, the Seed Policy document was issued in 2002.

developments, among others, have thus brought in new experiences and dimensions to the formal seed sector in Eritrea.

With regards to the review process, the MoA established a technical committee, drawn from its technical departments, namely; the National Agricultural Research Institute (NARI), the Agricultural Extension Department (AED) and the Regulatory Services Department (RSD) – serving as the coordinator for the review process.

The committee made an in-depth analyses of the experiences gained thus far and future trends of the seed sector. The benchmark in reviewing the seed policy document is its contribution to the achievement of national food and nutrition security, which, as indicated above, remains among the main goals of the government of Eritrea.

Tekleab indicated that the technical committee finally produced a revised seed policy document for consideration by the MoA, which then organised a consultative workshop on 16 February 2023, with the aim to gather information to enrich the revised seed policy document. Around 40 participants comprising Minister Arefaine Berhe, senior officials from the MoA, HAC and Zobas, participated in the workshop.

"The workshop was highly participatory, where many views and comments were expressed to further improve the draft document. As the time was too short to accommodate all comments during the workshop, some days were given for participants to reflect their views in writing after going to their respective places," Tekleab concluded.

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Climate change has urged Zimbabwean farmers into adopting conservation farming techniques such as no-till farming.

Going till-free to save time, soil and money

TILLAGE IS A process involving soil structure modification which has long been a part of crop farming. This process is mainly used to aerate the soil and control weeds and pests. However, frequent tillage can have severe negative effects on soil quality, cause soil structure disruption and result in the acceleration of surface runoff and soil erosion.

Image Credit: Adobe Stock

Frequent tillage can have severe negative effects on soil and water quality, cause soil structure disruption and rest in the acceleration of surface runoff and soil erosion.

Impact of tillage on soil quality

The level of impact that tillage can have on the soil primarily depends on the frequency of tillage. For example, if frequent tillage is sustained over a couple of seasons, a total breakdown of soil structure is likely to occur. This can also affect soil organisms, thereby bringing microbial activity to a halt. Pores in the soil also close down, limiting infiltration and increasing runoff. Therefore, moderate levels of erosion, coupled with organic matter and nutrient loss can result in the initial loss of productivity.

The level of impact however grows more severe as frequent tillage is sustained over a period of years. At this stage, total break down of soil structure and overall soil quality is almost assured. Moreover, a hardpan is likely to develop, effectively cutting off root elongation, crop development and yield.

Producers reaching this point may experience high erosion rates and degradation of topsoil, where nearly all organic matter is located. Removal of topsoil by erosion contributes to a loss of inherent soil fertility levels since almost half of plant-available phosphorus is concentrated in topsoil as is nearly all of the plant-available potassium.

Impact of tillage on water quality

Frequent tillage can have a negative effect on the overall surface water quality. Sediment from soil erosion transports nitrogen and phosphorus from fields into lakes and streams, thus acting as a major water quality pollutant. This gives rise to a serious surface water quality problem known as eutrophication.

Besides these environmental effects, tillage can also be a costly process in terms of extra wear on machinery and extra labour requirements.

> **"The zero till process involves leaving the soil undisturbed, thereby improving fertility by retaining the soil structure and microorganisms."**

Zero tillage farming

This is a soil cultivation process also known as no-till farming that allows farmers to plant crop seeds directly into the soil without tilling. The process involves creating slot trenches of suitable depth and seed coverage using a zero machine or zero tillage machine.

The main advantage of the zero till process is that, unlike tilling, the soil surface is mostly left undisturbed, thereby improving fertility by retaining the soil structure and microorganisms. Moreover, the process also reduces the cost of land cultivation and irrigation requirement, thus increasing its affordability among farmers.

Types of no-till farming equipment

With growing concern for cost and environment, many farmers are now going till free. A number of no till farming equipment are available in the market to choose from. Some of the best ones include:

- No-till planter: This is considered the most essential equipment, especially for farmers who are stepping into no-till farming
- Roller/ crimper: It comprises of a large, heavy cylinder with long blades, which when rolled over a cover crop, kill them in place to make moisture-conserving mulch as part of the ground cover for crops
- All-in-one tillage equipment: This option consists of only one piece of equipment ranging from 300cc to 500cc in the market, and is suitable for those who are entering into no-till farming but are not interested in investing on multiple pieces of equipment
- Broadforks: These are hand tools with long tines that are perfect for digging deep into the soil when turning it, thus being an effective no-till method that eliminates compacted soil and other issues
- No-till seed drill: This piece of equipment helps place seeds at the correct depth and space apart, ensuring accuracy of crop planting

Besides their intended purpose, zero till machines can also work as fertiliser spreaders as they consist of different boxes for seeds and fertilisers. They may also

include seed and fertiliser metering mechanisms, furrow openers, seed tubes, seed and fertiliser rate adjusting levers and transport cum power transmitting wheels.

Zimbabwean farmers adopt no-till farming

Low and erratic rainfall experienced in Zimbabwe is what makes successful agriculture in the region so challenging. Climate change has hence urged farmers into adopting conservation farming methods such as no-till farming.

According to a report by *Daily News*, organisations such as the Self Help Development Fund (SHDF) have been providing training and essential resources to villagers, with the aim of perfecting their no-till farming adaptation skills.

"The Pfumvudza concept helps rural farmers who depend on rain-fed agriculture to counter the effects of climate change and increase agriculture production."

Zero tillage farming involves creating slot trenches of suitable depth and seed coverage using a zero tillage machine.

Image Credit: Adobe Stock

Zimbabwe's Pfumvudza planting technique offers solution to drought

The Zimbabwean word Pfumvudza is used to refer to the conservation agriculture concept, a crop production intensification approach under which farmers ensure the efficient use of resources on a small area of land in order to optimise its management.

The Pfumvudza concept is a viable, resilient strategy that can help rural famers who depend on rain-fed agriculture to counter the effects of climate change and increase agriculture production, thereby contributing to the achievement of Sustainable Development Goal (SDG) numbers 1 and 2 (eradicating poverty and improving food security).

A research published on NCBI in December 2022, assessed the effectiveness of Pfumvudza as a resilient strategy against climate change induced drought impacts in rural communities of Zimbabwe, as in the case of Munyarari ward 20. Results of the study showed that Pfumvudza improved yields and reduced donor aid in areas affected by drought. Hence, the research recommends farmers to fully embrace the Pfumvudza strategy so as to realise high yields and improve food security. Ⓑ

Africa adopts bio-based packaging solutions to boost farmers' income, while at the same time reducing food loss.

Bio-based packaging solutions for a better tomorrow

FOOD LOSS AND waste reduction (FWL) is a global concern, reflected in the 2030 Agenda for Sustainable Development, particularly Goal 12, which highlights responsible consumption and production.

According to a study published in Springer, food loss reduction must accordingly complement increasing crop productivity toward sustainably feeding increasing populations. This is especially important in regions of sub-Saharan Africa, where food insecurity is at its peak and the population is predicted to double by 2050. According to an FAO report published in 2019, 15.9-17.2% of the food produced annually is

The use of bio-based packaging prevents transportation damage, while also avoiding subsequent degradation.

Image Credit: Adobe Stock

lost, with losses in cereals and pulses mainly occuring during on-farm post harvest operations storage, processing and packaging.

Need for bio-based packaging

The use of bio-based packaging is one of the best ways of preventing damage during transportation, while also avoiding subsequent degradation.

An MDPI report mentions that packaging solutions have real advantages in terms of efficiency, initial investment cost and profitability. In addition, the use of agricultural waste for the design of these packaging solutions would valorise agricultural waste. This valorisation in addition to reducing losses would be an additional source of income for farmers and local communities. They also present advantages in terms of preserving nature and the health of consumers.

Innofood Africa, a project that focuses on addressing the key bottlenecks of African food value chains, has investigated crop sidestreams and food wastes for their suitability for bio-based products. The model packaging created from agro waste is believed to be suitable for export markets and create a new source of income for farmers, thereby enabling them to become more resilient.

Sidestream utilisation

An evaluation of sidestream availability across various regions of Africa namely, Uganda, South Africa, Kenya and Ethiopia, showed the largest availability in finger millet, cowpea, orange fleshed sweet potatoes, teff and faba bean respectively. This meant that sidestream containing solutions could easily replace imported plastic and rubber products, while also being used to create export products.

The Innofood Africa project, in its report, mentions the following three practical recommendations to enable sidestream utilisation:

- Immediate removal of sidestreams from fields, shortly after harvesting
- Preventing microbiological activity on sidestreams by performing drying
- Discussions with plastic processors regarding desired quality becomes essential, given the influence of sidestream milling on the quality of end products

"Innofood Africa has investigated crop sidestreams and food wastes for their suitability for bio-based products."

Characteristics of food packaging materials manufactured by agricultural biomass

A 2021 research project was successfully able to develop a biodegradable food packaging material based on cellulosic fibres obtained from maize husk and sisal, and cellulose pulp obtained from maize husk. Results from mechanical testing indicated that the mechanical properties of the biocomposite materials were related to the composition of the types of fibres used. Tear and tensile strength was found to increase with the rising proportions of sisal fibres in the biocomposite material. Furthermore, the study observed that the biocomposite material achieved good abrasion resistance that permitted its usability in food packaging without necessarily losing its properties.

This meant that that the food packaging material developed had the potential to effectively replace non-renewable resources used in food packaging industries.

Bio-based food packaging equipment

Single-screw extruders and twin-screw extruders are the two main types of extrusion processing that are used for compounding and polymer blending. Out of the two, twin-screw extruders have been found to play a more important role in capacity increase.

In addition, morphology of polymer blends is also known to influence their biodegradation rate. One important aspect of biopolymer processing is controlling humidity. High humidity during polymer extrusion increases melt fluidity due to chain scission, which is why drying sections are implemented in industrial plants. For extrusion, pellets of biopolyesters are usually heated in the presence of a dried air flow with a low dew point, while stirring the melting pellets to avoid undesired agglomeration.

For the production of rigid plastic containers, either injection molding or thermoforming are used. The temperature of the mold, the holding pressure and time are the parameters that are most important to control. Biopolymers such as PLA and PHB can crystallise during the holding step, so the temperature of the mold and the holding time influence the crystalline morphology of the material. In turn, the amount and distribution of crystals in the material influence the material's properties. Contrary to injection molding, trays, plastic cups, blisters, and jars are produced by thermoforming. Polymer film, produced by flat die extrusion, with a thickness in the range of 50–300 μm is used for the thermoforming process. The material is usually heated by an infrared heater above its glass transition temperature but below its melting point to obtain a softened sheet. A mold is then inserted (or a vacuum is applied), which brings the softened sheet into the desired shape.

Initally available for only a few machines categories, the JOSKIN configurator is now evolving to cover the entire range of products.

Configure your JOSKIN machine in a few clicks

ONE YEAR AGO, JOSKIN announced the official launch of an online configurator for the company's range of products.

With the tool, the aim of the Belgium company was clear: to use digital solutions to stay as close as possible to the farmers. Accessible on a smartphone as well as a tablet or a computer, the configurator thus completed a growing range of digitial tools dedicated to the company, joining a roster of new webistes, digital showrooms, and virtual tours of the JOSKIN factories. Through the configurator, the company wanted to offer everyone the opportunity to design its own machine.

The first machines that could be configured were the livestock trailers and aerators. They were then joined by the livestock and transport ranges. Encouraged by the success met, the JOSKIN team has contributed its efforts and are now announcing the extension of the entire range of products.

Image Credit: JOSKIN

The configurator allows anyone to create their own machine with their desired specifications.

Easy, practical and transparent

As a reminder, the philosphy of the configurator is to provide an intuitive working tool, capable of guiding each Internet user in their choices in order to enable them to define the JOSKIN machine of their dreams.

For each of the ranges, a wide choice of options and equipment is available to find the configuration which best meets each specific need. Once the process is finalised, a gross price is automatically generated to give an idea of the final cost of the machine. If the customer decides to go further, the user can download the complete documentation for their configuration and contact the JOSKIN dealer of their choice to obtain more information on the product, or simply to place an order. Therefore, choosing a machine has never been easier.

The configurator will provide a intuitive working tool capable of guiding users in their choices to enable them to define the JOSKIN machine of their dreams.

Image Credit: JOSKIN

The entire range of JOSKIN products can now be configurated.

Image Credit: JOSKIN

Following process finalisation, a gross price is automatically generated to give an idea of the final cost of the machine.

Harnessing solar energy to enhance irrigation systems helps boost farmers' yield, thereby ensuring economic stability.

Solarising Africa's irrigation systems: the need of the hour

ACCESS TO WATER is a critical requirement for African farmers, especially those who mainly depend on rain-fed agriculture for crop production.

Using a solar-powered irrigation system (SPIS) is considered a far more efficient and reliable means by which the very same farmers can have year-long farming yields, rather than the twice-yearly of short and long rain seasons, undoubtedly promoting better agricultural outcomes.

SPIS can be applied in a wide range of scales, from individual to community vegetable gardens, to large irrigation schemes and comprise of the following

SPIS reduces GHG emissions and helps overcome water stress during dry seasons.

Image Credit: Adobe Stock

essential components:

- A solar generator comprising of a PV panel or array of panels to produce electricity
- A mounting structure for PV panels, fixed or equipped with a solar tracking system to maximise the solar energy yield

A pump controller

- A surface or submersible water pump (usually integrated in one unit with an electric motor)
- A distribution system and/or storage tank for irrigation water

According to a report by the Food and Agriculture Organisation of the United Nations (FAO), SPIS has its fair share of pros and cons.

Benefits of SPIS:

- Direct potential to reduce greenhouse gas (GHG) emissions by replacing fossil fuels with renewable energy
- Constitutes a reliable energy source for irrigation water pumping in remote areas
- Helps overcome water stress in dry seasons when groundwater becomes the only reliable water source
- Plays a role in stabilising, increasing and diversifying production

Challenges of SPIS:

- High cost of investment and lack of appropriate funding schemes
- Economic viability and attractiveness for farmers is often compromised by subsidies for liquid fuels or grid electricity
- Lack of skilled personnel for the design, installation and maintenance of SPIS

"Nexus Green to complete installation of around 687 solar-powered irrigation sites in Uganda by 2024."

Solar water pumps have the potential to bring in huge additional income for farmers.

Image Credit: Adobe Stock

400 solar-powered water irrigation sites to be installed across Uganda

The Governments of Uganda, along with the United Kingdom, have jointly invested in a US$117.8mn project to improve agricultural productivity for more than 3,000 Ugandan farmers in water stressed regions of the country.

Uganda-based solar energy company ,Nexus Green Ltd., has planned to complete the construction of around 687 solar-powered water irrigation sites in Uganda by 2024.

According to a report published by EABW News, the project is expected to bring about a 60% reduction in water tariff on 220 urban water supply schemes. This is an addition to the obvious reduction in green energy and carbon footprint, the report stated. Moreover, agronomy experts will provide farmers with essential farm management skills, along with information regarding competitive pricing and market access.

Ecozen contributes to sustainable development in Kenya

Back in 2021, Indian company, Ecozen, also decided to make a sustainable move by installing solar water pumps and solar cold rooms to revolutionise the agri sector in Africa, with particular focus on East African regions such as Kenya.

Solar water pumps

A majority of farmers in Africa depend on rain-fed irrigation for optimum produce and sale. However, irregular rainfall can result in droughts and low crop yields. In such cases, water pumps come in handy. In countries like Uganda where water pumps are present, the number of diesel pumps outgrows the number of electric pumps.

Ecozen has therefore taken the initiative to create solar pumps for efficient water supply in farms. These pumps have the potential to bring in huge additional income for farmers, thereby increasing their overall economy.

While investing in a solar water pump, it is also important to invest in another important component: the inverter.

Inverters are generally used as a backup during cloudy or low-light days when there is not enough sunlight to power up the solar water pumps.

In such cases, they can help keep water pumps running even in the absence of solar, thus making them an important component of a solar water pump.

Solar cold rooms

- Ecozen's efficient solar cold room, Ecofrost has appealed to multiple stakeholders including farmers, traders and exporters.
- Solar cold rooms can be used in multiple stages of the supply chain:

Farm-level pre-cooling

- Pack houses/ collection centres for pre-coolings
- Nearby airports for staging

Livestock management which was earlier regarded as a complex, round-the-clock job has now been made simpler and easier with the adoption of IoT.

Livestock sector receives IoT tech boost

TECHNOLOGY HAS SEEN exponential growth in the recent years and is quickly becoming an integral part of everyday life. Most sectors today are adopting the latest technology to automate and accelerate processes, and reduce manual labour. This is where Internet of Things (IoT) comes into picture.

As defined by a research paper published in 2021, IoT refers to a system of interconnected devices and/or sensors that transmit and relay localised information and parameters over a closed or semi-open wireless network. The introduction of new smartphones and 5G network connectivity has enabled IoT to change the field of automation.

IoT in the livestock sector

Livestock management, which was earlier regarded as a complex, round-the-clock job has now been made simpler and easier with the adoption of IoT.

The platform is now being used in a variety of livestock management practices:

- **Herd monitoring:** GPS sensors with geo-fencing capabilities are attached to livestock collars, which help track herds in real time. This is achieved through various local parameters like speed, body temperature, location and stress levels of livestock. As a result, there is a significant decrease in operating costs and inefficiencies, along with an overall improvement in the health and safety of livestock. Moreover, the response time provided by the system is high, thereby providing accurate results and a high ROI for implementing this system for herd management.

> **"Several developing countries including Africa has started incorporating IoT into their livestock management practices."**

- **Herd safety:** Rugged, tamper-proof devices that are smart enough to distinguish between human and animal movement, are used to secure gates and prevent livestock theft. This is carried out using two types of assessment — visual and genetic. Visual assessment (phenotypic) selection uses appropriate pattern recognition to identify an animal based on its body conformation, size, posture, color, udder and testicle size and placement of different parts. Genetic assessment (genotypic), on the other hand, is based on known inherited characteristics and historical facts which are influenced by an animal's genetic characteristics. This is done by genetic evaluation methods such as Estimated Breeding Value (EBV) or Expected Progeny Difference (EPD).Important traits like reproductive efficiency, growth rate, carcass quality, and parasite resistance can be predicted using the above evaluation methods.

Image Credit: Adobe Stock

Locator nodes comprising of a Bluetooth Low Energy (BLE) beacon are attached near the ears of the animals to help determine their position.

- **Herd location monitoring:** Locator nodes comprising of a Bluetooth Low Energy (BLE) beacon are attached near the ears of the animals to help determine their position. Signals from these locator nodes transmit latitude/longitude coordinates remotely to the Centralised Location Aware Platform, following which the data is processed and the positions of the animals are determined. Moreover, BLE beacons with special sensor functions are used to generate customisation reports. Historical data can also be evaluated and compared with real-time data at any time. Using the location/region of the livestock grazing, predictive alerting can be determined using the weather API, thereby providing the targeted climate of the stable.
- **Grazing monitor:** An IoT enabled sensor is installed on the collar of each cow, which provides latitude/longitude coordinates of the cow during movement. The data is then sent to the Central Application cloud to be stored and runs algorithms, providing insight into the grazing duration of the animals, along with levels of ammonia emission. This data is quantitative and provides a well defined chart, specific to the individual cow and its health.

IoT in the African livestock system

Several developing countries including Africa have also started incorporating IoT into their livestock management practices.

The Jaguza livestock app which is currently operational in more than 40 communities in 62 Ugandan local farms, is one such example.

Jaguza livestock app — an efficient addition to Ugandan farms

The app is an online and offline livestock management system that uses IoT, machine learning and data science to detect diseases, track animal movements, provide weather forecasts and enable interaction between experts and farmers.

The Jaguza app works by installing a solar powered base unit on the farm and fixing the device on the animals. Temperature, activity and behaviour of the cows is measured by the device and sent to servers through the base station. This data is then processed and actionable recommendations regarding the health and oestrus cycle of cows are notified.

Lately, a number of reputed IoT companies are recognising the need for technology in ensuring global food security, and are coming forward with innovative devices and solutions to help enhance agri sector development.

Streamline to deploy 400,000 cellular 5G NB-IoT livestock devices

Sateliot, the first satellite constellation offering 5G standard connectivity from space, and Streamline, the leading South African company in livestock management, are joining forces to improve livestock management services to farmers worldwide.

In 2023, Streamline plans to deploy 400,000 cellular 5G NB-IoT livestock devices capable of connecting seamlessly to both cellular towers and Sateliot's constellation. Sateliot's Non-Terrestrial Networks act as cell towers in space, giving Streamline's 5G NB-IoT devices the ability to work in uncovered areas. Streamline's goal for the coming years is to reach a landmark of seven million devices worldwide.

Astrocast and Digitanimal partner to boost livestock management

Astrocast, a leading global nanosatellite IoT network operator, and Digitanimal, a leading smart solutions developer in livestock tracking devices and solutions, has announced the signature of a strategic partnership to develop a Satellite IoT (SatIoT) solution.

Both companies are collaborating to commercialise an unrivalled tracking device that connects to Astrocast's global satellite network. The SatIoT-based collar will enable farmers to track livestock remotely. This will allow them to adopt Agriculture 4.0 farming practices as they manage their herds.

Carlos Callejero, CEO at Digitanimal, commented, "Within remote farming environments there is often little or no terrestrial network connectivity. To solve this problem, some farms try and install antennas and base stations to deploy ground networks and access cloud technologies. But, it is challenging for many farmers to deploy a reliable and financially viable infrastructure, especially if they do not have a high volume of animals to monitor.

"Our goal is to change this situation for these remote farmers, as we incorporate Astrocast's low-power, cost-effective SatIoT into our livestock tracking solutions. This technology – and the access to data that it provides – will enable farmers to accurately establish the location of their herds anytime and anywhere, allowing them to better manage livestock. For example, they can track movement patterns and create geo-fences to detect when livestock has drifted into areas they should not be."

"Lately, a number of reputed IoT companies are coming forward with innovative devices and solutions to help enhance agri sector development."

Countries in Africa and Asia have large, extensive herds in vast regions with no reliable cellular network access. In Europe, it is estimated that there are 87 million cows and 50% of these animals are located in areas without terrestrial/network coverage.

Through this partnership, it will be possible for any farmer across the world to connect their animals to the cloud and track them. The service will be cost-effective and affordable to farmers, as it has been developed with the latest satellite technology.

Benefits of IoT and AI adoption

Both these technologies play a significant role in the dairy industry to simplify the operations for milk producers and meet the increasing demand for quality dairy products. Although the milking process in a dairy farm is often viewed as a singular process, there are several activities that are performed in the farm such as feeding, cow monitoring, and milk preservation. The technological advancement in IoT can thus help minimise environmental issues, decrease the use of resources, and enhance animal health by using advanced sensing and data analysing technologies.

Moreover, with food insecurity being a pressing issue in today's world, IoT's numerous applications in the agriculture sector makes it one of the fastest growing markets in the world.

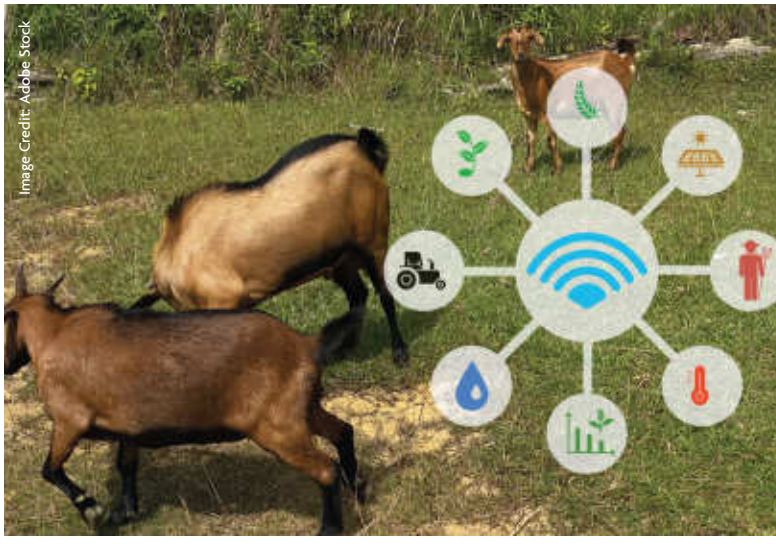
Image Credit: Adobe Stock

The Astrocast and Digitanimal partnership will enable any farmer across the world to connect their animals to the cloud and track them.

Poultry farmers benefit with feed mixing machine

SOME 988 WOMEN in Laikipia involved in poultry farming have benefitted from a chicken feed mixing machine aimed to cushion them against high feed prices attributed by drought.

The feed mixing machine valued at Sh 310,000 was donated by United Nation Women (UNW) through Korean International and Cooperation Agency (KOICA). It will see the women drawn from Tigithi, Umande and Mukogodo East wards manufacture their own poultry feeds and sell the surplus to local farmers.

"This feed mixing machine will help us in a big way because lack of feeds is what led us to appeal for donation. We are optimistic that in the next few months our businesses will thrive," Ogilgel women group chairlady Agnes Cherotich from Umande ward and where the mixing machine is based told KNA.

The move to automatic evisceration

ANY POULTRY PROCESSOR anywhere in the world whose business is growing will one day face the decision to move from manual to automatic evisceration

Once a poultry processor has started processing industrially, he will have installed a scalder, plucker and overhead conveyor systems for the killing, defeathering and evisceration processes. Growth in hourly capacities will involve installing additional equipment. In the case of the killing and defeathering department, this is straightforward and will largely involve adding sections to the scald tank and installing more plucking capacity.

Hand tools

Capacity increases will affect the evisceration department differently. At very low hourly throughputs all evisceration operations will be done manually using specialised hand tools. As capacities increase, technology will begin to creep in. Initially, this will be limited to the use of hand-held vent and lung guns to drill out the vent and to vacuum any residual lungs from the inside of the hand-eviscerated carcass.

Increasing line speeds

The need for more capacity will also mean that a processor is becoming established in his market and is increasing his customer base, thanks no doubt to a reputation for good quality and service. He will of course want to keep this. As line speeds increase, certain manual evisceration operations become more problematic. This is particularly true of removing the viscera pack from the carcass. A poorly eviscerated carcass will spoil quickly and, if edible giblets are damaged during the evisceration process, they will be unsaleable and revenue will be lost.

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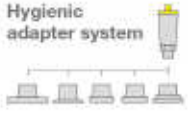

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