DIGITALISATION FOR FUTURE MEAT SUPPLY

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Even though the world still struggles with a devastating epidemic that has led to millions losing the battle against COVID19, population growth will grow by 30% over the next three decades. This population growth will lead to an increased demand for food. According to Accenture's "Future of Food" report in 2017, global protein demand will have to increase by 80% over today's levels. The reality is that our traditional farming practices will not be up to the yield challenge. The world will require changes in how food is produced and retailed globally to supply in the rising demand. Underlying these rapid changes are macro forces that influence how the world produces, distributes, buys, sells, and consumes food.

Environmental Issues

Despite the industry's requirements to produce more, livestock farmers will have to accomplish this environmentally friendly and sustainable. The environmentalist is not viewing the industry positively in this department.

The Food and Agriculture Organisation of the United Nations released a report in 2006 that pointed to the livestock sector as one of the top three most significant contributors to severe environmental problems. The livestock sector uses one-third of global arable land and 8% of available freshwater. In South America, it is also primarily responsible for deforestation and biodiversity loss and contributes 15% of global CO_2 emissions. Therefore, livestock's contribution to environmental problems is on a massive scale, and the impact is so significant that it needs to be addressed with urgency.

Precision Livestock Farming

Action is required if, as predicted, meat production will more than double from now to 2050.

The industry needs to halve impacts per output unit to achieve a mere status quo in overall impact. Precision farming has significantly impacted crop farming over a couple of decades with great success. Crop farmers will know it as is the management concept based on observing, measuring and responding to inter and intra-field variability in crops. Precision agriculture aims to define a decision support system for production management to optimise inputs while preserving resources.

Precision livestock farming differs in its use of advanced technologies to optimise an individual animal's contribution. Through this ''per animal'' approach, the farmer aims to deliver better results in livestock farming. Those results can be quantitative, qualitative and addressing sustainability.

The technologies brought to us by Industry 4.0 will have to be deployed through precision farming techniques to supply in demand for protein in a sustainable and environmentally friendly way. By doing that, livestock farmers will get more productive and use resources more effectively.→

Fourth Industrial Revolution

The solution lies in the effective use of the technologies that form part of the Fourth Industrial Revolution that significantly changes the world we live and operate in. Klaus Schwab, founder and executive chairman of the World Economic Forum and the author of the book '*The Fourth Industrial Revolution*' states that

> " in the future, technological innovation will also lead to a supply-side miracle, with long-term gains in efficiency and productivity. Transportation and communication costs will drop, logistics and global supply chains will become more effective, and the trade cost will diminish, all of which will open new markets and drive economic growth."

Also known as Industry 4.0, it describes the blurring of boundaries between the physical, digital, and biological worlds. It's a fusion of advances in artificial intelligence (AI), robotics, the Internet of Things (IoT), 3D printing, Blockchain Technologies, quantum computing, and other technologies. It is the collective force behind many products and services that are fast becoming indispensable to modern life, and we use it daily. Think GPS systems that suggest the fastest route to a destination, voice-activated virtual assistants such as Apple's Siri, personalised Netflix recommendations, and Facebook's ability to recognise your face and tag you in a friend's photo.

Radio-frequency identification (RFID)

Radio-frequency identification (RFID) technology in livestock farming is the first step to precision livestock farming. The EID (electronic identification) RFID tag allows us to create a digital twin of the physical animal. Without the EID tag, precision farming in livestock is not possible. Removing the EID tag from the animal, in effect, terminates the digital twin and the advantages of precision livestock farming. The RFID technology, which includes the EID tag, the scales and the handheld readers, allows us to make the animal part of the Internet of Things (IoT).

The Internet of Things (IoT) brings many advantages for livestock farming to face the challenges as previously discussed. Today's digital landscape, devices, machines, and objects of all sizes can automatically transfer data through a network, effectively ''talking'' with each other in real-time. The top five advantages of the IoT is cost reduction, efficiency and productivity, mobility and agility, business opportunities and customer experience.

Blockchain Technology

Blockchain aims to provide a new method of working together through decentralisation. At the same time, it's important to remember that decentralisation isn't an all-or-nothing goal but rather a balanced one that often necessitates trade-offs for practical reasons. As a result, a supply chain needs both centralised and distributed components. The industry's information technology solutions have traditionally been a patchwork of centralised components, some of which may cause compatibility issues or other challenges for businesses. The introduction of blockchain technology offers the possibility of solving some of these issues.

Blockchain acts as a ledger for recording transactions at their most basic level. It possesses two features that make it ideal for food supply chain management. First, as already mentioned, it's decentralised. Instead of a single ledger recording transactions, the ledger is distributed over a network of nodes, each keeping a copy of the recorded transaction. This means that anyone with appropriate permissions can log into the ledger and view changes in real-time, regardless of where they occur.

Second, transactions on the Blockchain cannot be hidden or manipulated. To be verified, everything entered in the ledger requires network consensus. It must be recorded in the same way on each ledger. As a result, deleting or altering items creates a record of when and by whom it was erased throughout the whole network.

This combination of a distributed methodology and ''always-on'' recordkeeping is what supply chain managers require to transform complexity into transparency. Transparency refers to identifying an item in the supply chain and determining where it is, has gone, and will go next.

Controlled visibility

Blockchain's unique qualities address the inherent blind spots in today's supply chains. The distributed approach of Blockchain, for example, reduces the time delay between something happening in the supply chain and the system updating the state. Just think of the opportunity to unlock value-chain financing if inventory and financial information are updated in real-time. Everyone with the appropriate permissions may see exactly where the unit of value is. As a result, comprehensive transparency into transactions between retailers, suppliers, and financiers is possible for the first time.

This improves coordination and streamlines interactions between parties, while the inability to tamper with the information increases trust. For this reason, Walmart, the largest retail company globally, sent out a letter in 2020 urging their suppliers to track their products using Blockchain. According to the statement, tracking down essential data from many sources is exceedingly time-consuming using the old paper-based technique of gathering information used at many farms, packing houses, and warehouses.

The concept of food traceability was tested within Walmart in 2016 when a team was asked to track down the origins of a bag of sliced mangoes. It took them six days, 18 hours, and 26 minutes to complete the task. Even though all of the data was available, getting to the information took a lengthy time.

> Walmart can now monitor mangoes held in its US stores within 2.2 seconds or as they would refer to it at the speed of thought.

A new way of working

Blockchain technology can provide a version of the truth in the agri-food system, allowing the production process to be trusted, traceable and transparent. While it does not solve farm data problems on its own, it can be a powerful catalyst for new ways of working, allowing for greater accountability and consensus, and providing a single view of the animal's value in real-time for bankers, growers and traders.■