Innovation on the farm: How science is transforming agriculture

Uganda's agricultural story is no longer just about subsistence, it's about science, innovation, and profit. From high-yield maize varieties to dairy cows producing ten times more milk, and poultry farms out-earning government salaries, modern technology is rewriting the future of farming. With vaccines, fertiliser factories, irrigation systems, and mechanisation centres on the rise, Uganda is proving that innovation is the key to turning limited land into limitless opportunity. The Permanent Secretary of the Ministry of Agriculture, Animal Industry and Fisheries **Maj. Gen. David Kasura Kyomukama** had a chat with **Racheal Nabisubi**



Ministry of Agriculture, Animal Industry and Fisheries PS Maj. Gen. David Kasura Kyomukama PHOTO/RACHEAL NABISUBI

Uganda's agriculture has really transformed. What does this new paradigm look like?

The transformation is about shifting from subsistence farming to commercial agriculture. Farmers are now encouraged to cultivate crops not only for food security but also for surplus that can be sold for income. This change is supported by innovation better breeds, improved seeds, stronger genetics, and modern technologies. For example, cows that once produced only two or three litres of milk now yield 30 to 35 litres. This is real transformation.

How has interest in agriculture changed among Ugandans?

Previously, agriculture was seen as something for rural communities, handled by uncles and grandfathers. Today, everyone is interested because they see agriculture as a profitable business. In fact, nine out of 10 people employed in Uganda are involved in agriculture in some way; whether on farms, in industries, or in trading and transporting products. Agriculture has become a national enterprise.

How does the Ministry of Agriculture measure progress in commercialising agriculture?

We look at export earnings and productivity. Coffee alone now brings in about $2.5 billion annually, compared to just $287 million in 1986. Total agricultural exports stand at $4.3–4.4 billion, which is about one-third of Uganda's total exports. Beyond figures, we see transformation in how people farm moving away from hand tools to mechanisation, diversifying enterprises, and embracing modern practices.

What are some examples of diversification in Uganda's agricultural exports?

In the past, our economy relied on six key products: coffee, cotton, copper, tobacco, tea, and tourism. Today, we export milk, maize, cocoa, eggs, fish, avocado, and fruits. You can even see trailers loaded with eggs heading to neighbouring countries. This diversification shows how far we've come.

How is innovation and research driving this transformation?

Research in genetics, mechanisation, and climate resilience has been critical. We are mitigating the effects of climate change by developing resilient crops and livestock. Unlike in the past, when regions like Karamoja relied on food aid, communities are now producing their own food and even demanding tractors to expand production. This resilience is proof of real transformation.

Paint us a picture;what innovations are helping farmers produce more efficiently today?

First and foremost, good varieties, seeds, and stock. For crops, it's about improved seed; for animals, it's about better genetics. With good genetics, a farmer can produce up to 35 bags of maize per acre on average in Uganda. Without them, yields are only about 700 kilogrammes. That means yields can increase fivefold simply by using improved genetics. When you add fertiliser and proper weeding, production can double again, reaching nearly 50 bags, or about five tonnes from a single acre.

Can you give examples from livestock farming?

In dairy, with proper care and feeding, it's possible to produce more than 200 litres of milk from just 10 cows. The key is ensuring they are well-fed, comfortable, and healthy. In poultry, the transformation is even more striking. I can tell you that I earn more from poultry than I do from my government position. With flocks of 10,000 to 15,000 birds, the returns are significant. This is innovation in action showing how modern practices and better management can turn farming into a highly profitable enterprise.

How has innovation helped Uganda move forward, and how can it be leveraged for the people?

Innovation is essential because land and resources are finite. We cannot expand land endlessly, so the best way forward is to improve productivity on the land we already have. This is achieved through science, research and development, and good farming practices. Innovation gives us better seeds, improved breeds, and modern technologies that allow farmers to produce more efficiently and sustainably.

How is the ministry supporting farmers to adopt modern technology?

We are doing this in two main ways. First, through the media by highlighting success stories and showing farmers what is possible. For example, tomorrow we are launching Uganda's first anti-tick vaccine factory. Tick-borne diseases cost Ugandan cattle keepers about $1.1 billion annually, with nearly $387 million spent on imported acaricides. This vaccine, developed entirely by Ugandan researchers, will be a game-changer.

Second, the government is investing in critical infrastructure. We are building a vaccine factory for foot-and-mouth disease, establishing fertiliser factories including organic fertiliser initiatives and rolling out irrigation systems to reduce the risks of drought. Mechanisation is also being scaled up through mechanisation centres where farmers can hire tractors at affordable rates, between 50,000 and 80,000 shillings per acre.

Beyond technology, how is innovation being applied in markets and value addition?

Value addition is a priority. Factories for coffee, juice, dried fruit, and other products increase demand for raw materials, which in turn raises farmgate prices and benefits primary producers. For example, the coffee factory in Ntungamo has been criticised, but in reality, it stimulates demand and improves prices for farmers. We want more factories like that to strengthen the entire value chain.

What lessons can Uganda learn from other countries?

The Netherlands is a powerful example. Despite being one-sixth the size of Uganda, with much of its land reclaimed and below sea level, it is the second-largest exporter of agricultural products after the United States. Small farmers there can earn turnovers of 3.5 million euros annually. Their success is built on two pillars: strong regulation and market confidence. When regulation is strict, farmers self-regulate to maintain quality, which builds trust in markets and ensures better prices.

What role does mindset change play in agricultural transformation?

Mindset is critical. Farmers and the public must see agriculture as a modern, profitable business. The media plays a big role here. Instead of focusing only on negative stories, we need to highlight opportunities and successes. When farmers prosper, they invest more, buy more products, and strengthen the economy. Positive messaging builds confidence in Ugandan agricultural products and helps us compete globally.



President Museveni during the commissioning of the anti- tick Vaccine and commissioning of the production plant at Namulonge. PHOTO/COURTESY