Smart data yields big harvests to feed the world

By Simon Carpenter   7 Dec 2017

The global population is careening toward 11 billion by 2100, up 52.7% from the 7.2 billion recorded in 2014. Looking at a more immediate date and in our lifetime, 2050, the projected population climbs to 9.1 billion.

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Is current agriculture production equipped to feed these masses, especially those in poorer, undeveloped regions? Can farmers keep up with the 80 million people that are added on average each year, and address the needs in sub-Sahara Africa, which is expected to have the highest growth? No one has a definitive answer, and the UN's Food and Agriculture Organization's (FAO) statement that it's "cautiously optimistic" about the world's potential to feed itself in 2050 is disturbingly tentative.

The FAO has tasked farmers to increase food production by 70% to feed the world's mushrooming population. To meet the demand, farmers must address water shortages due to climate change and poor farming practices that have eroded overall farm productivity. Big agriculture is responding to higher food demands by leaning on innovative thinking and new techniques to push up their production capabilities. Technology innovations are flooding into the market, and major players like Monsanto expect a boom in agricultural data science, as the market value reaches $20bn by 2020.

High-tech comfort zone

Big agriculture doesn't fear technology. The romantic view of men in overalls relying on The Farmer's Almanac and the moon's phases for planting, fertilising and watering crops is good for movies, but far from reality.

Farming is big business and has been for years. The industry adopted game-changing techniques and business models between 1960 and 1999 that reshaped industrial farming. During those four decades, farmers adjusted how they worked the land and increased food productivity by 150% to support a global population that was racing by today's growth rates and doubling in size. In those fertile years of the green revolution, farmers adopted new technologies, pesticides, and engineered high-yield crops to meet the huge demand for grains, vegetables, and fruit.

Cultivating crops with digital farming

To manage the coming swell, robots that harvest crops and digital farming are joining green revolution and time-held

traditional farming techniques. Digital farming is garnering lots of interest as it harvests the abundant details and layers of processes that make up the planting and harvesting cycles.

In digital farming, a farmer can plant, water, till, fertilise and harvest his crops without leaving the office. Digital farming combines telematics, geospatial analysis, analytics and business networks collaboration to give farmers a geo-based overview of their entire business.

When farmers login to their laptops, PCs, tablets or mobile phone they see an aerial image of their farms. They can take a virtual walk-through of any sector and understand exactly what is happening with their crop. Does it need water or fertilizer? Is the contractor scheduled to plant seeds? Are the seeds ordered and on their way? Sensors in the soil measure moisture, pH, and more to show farmers the state of their soil. A crop history shows past planting schedules and harvests. A list of scheduled and unscheduled tasks display irrigation, fertilisation, planting, spraying, and harvesting timelines. Farmers can schedule these tasks and assign a contractor to complete them.

Farmers interact with dozens of contractors and subcontractors throughout the planting seasons. Digital farming brings these contractors onto the field at exactly the right moment. When a crop needs irrigating, for example, the farmer first tests the land's moisture. The sensors can tell him the exact percentage of moisture in the land at 6am, 1pm and 5pm. He can look at records from last year at this same time, and he can run a quick analysis to see what the moisture should be three days, two days and one day before planting the crop of rye. If rain is in the forecast, the farmer can cancel the contractor and avoid an unnecessary expense.

One study found that farmers could increase yield by 15% and cut water usage by 50% if they had this information at their fingertips. For climates like water-starved California, every drop saved is critical.

> " *Digital farming brings an immediacy and precision that gives big agriculture a much higher chance to hit that 70% bump in food production it needs to feed the world.* "

All this information and more influence the crop's success and it creates an itemised history for consumers tracking their food from farm to fork.

Farm-to-table transparency

Consumer eating patterns have changed drastically since farming's green revolution launched in the 1960s. We eat out more. We eat more prepared foods. We differentiate between organic and non-GMO. The sheer number of food choices is overwhelming for hungry shoppers who are keen to know where their food is coming from and its ingredients. They want to know if a chemical additive is making an apple greener, were pesticides used and if the seed was genetically modified. Digital farming gives these conscientious shoppers the transparency they want into understanding exactly what they are feeding their families.

Tracking each process in the farm-to-fork cycle is expensive and time consuming for manufacturers. They argue that consumers would need to absorb the costs, and no one wants to pay a higher grocery bill.

Digital farming gathers all the crop information in a single spot, and manufacturers can put a premium on this data. Consumers have shown a willingness to pay more for organic foods. They may also be willing to pay for the specifics about farmers, seed providers, fertilisers, herbicides and other details that help them understand what they are feeding their families.

Technology that feeds the masses

Big data, analytics, and the Internet of Things seem to be made for non-farmers who live in urban areas and have complicated lives. Not so, these technologies cut to the heart of businesses that have layered processes and multiple people working together for the same outcome. They align perfectly in developed countries where consumers purchase groceries from a mobile app and drones monitor grape crops, and they promise efficiencies and broader access to food supplies in economically disadvantaged regions. Digital farming brings an immediacy and precision that gives big agriculture a much higher chance to hit that 70% bump in food production it needs to feed the world.

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