Little Uruguay has big plans for smart agriculture

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A combine harvester is used in a wheat field near the city of Mercedes, 270 km northwest of Montevideo, Uruguay, on December 4, 2014

Uruguay, a country of 3.3 million inhabitants and four times as many cows, hopes to feed 50 million people thanks to drones, "smart" combines and other high-tech farming techniques.

At a farm a two-hour drive outside the capital Montevideo, combines on

auto pilot meticulously harvest every millimeter of field.

The farmer inside the machine, instead of driving, follows its progress on a screen as it collects data on crop yields per square meter that he will analyze to improve next year's harvest.

"For us, harvesting information is as important as harvesting grain," said farmer Gabriel Carballal.

Carballal, 40, began working on his family farm in 1999, originally using traditional methods.

But then came a "revolution" in planting technologies, machinery and crop management techniques, he told AFP.

That revolution has nearly doubled his yields in the course of a decade, thanks to genetically modified seeds, high-tech machines and "direct sowing"—a technique that involves planting seeds directly into last year's fields, with minimal tilling, to protect the soil.

At the same time Uruguay, where the agriculture industry was traditionally geared toward cattle ranching, nearly tripled its crop land to 1.5 million hectares (3.7 million acres).

Wheat is unloaded from a combine harvester into a tractor at a field near the city of Mercedes, 270 km northwest of Montevideo, Uruguay, on December 4, 2014

The small country, an agricultural dynamo with a temperate climate that is sandwiched between South American giants Argentina and Brazil, leads the world in arable land per person, with 15 million hectares.

It is also likely the only country with four cows per person, each of them equipped with an electronic ear chip to trace every cut of beef in this nation of steak lovers.

Mathematics of erosion

By betting on technology and boosting productivity, Uruguay has already gone from producing enough food for nine million people in 2005 to enough for 28 million people today.

The government has set a target of eventually feeding 50 million people, 15 times the population.

Behind this "agro-intelligent Uruguay," as the government puts it, are decades of joint research by the state and private farmers and ranchers, said Agriculture Minister Tabare Aguerre.

"We're using the soil more intensively. Since we have more than 50 years of research telling us which variables affect erosion and loss of soil quality, we've developed public policies... that apply a mathematical model predicting erosion," he told AFP.

That model enables the government to regulate soil usage with drones and satellite imagery to ensure farmers are following the rules.

"It's developed as public policy but it's applied on the ground by nearly 500 private agronomics engineers," said the minister.

The government's flagship project is a national information system that will centralize data from each agricultural sector to guide policymakers.

The goal is to increase competitiveness but also protect family farms—75 percent of the total, but disappearing fast—and preserve the country's resources, said Aguerre.

"Protecting soil quality doesn't mean not using the soil, it means using it responsibly," he said.

He pointed to the example of Uruguayan cattle ranchers, who cut emissions by 28 percent from 1990 to 2010.

"With science, we can intensify production and be more environmentally responsible in terms of greenhouse gas emissions," he said.