How cattle ranchers in Brazil cope with weather shocks

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An extended dry season puts more stress on cattle in the Brazilian Amazon. Credit: Marin Skidmore, College of ACES, University of Illinois

Agricultural producers around the world must adapt to changing weather patterns. Much research has focused on mitigation strategies for crop

production, but livestock producers face unique challenges.

A new study from the University of Illinois looks at how cattle ranchers in Brazil respond to climate change in the Amazon. Previous research shows the dry season is increasing up to 0.6 days per year. This puts more stress on animals, and ranchers are more likely to sell their cattle early, says Marin Skidmore, assistant professor in the Department of Agricultural and Consumer Economics at U of I. Her paper is published in the *American Journal of Agricultural Economics*.

Brazil is the world's second-largest beef producer and the leading exporter. Forty percent of Brazil's cattle are located in the Amazon, which is particularly vulnerable to climate change and deforestation.

"Through talking with cattle ranchers, I kept hearing about ways they had to change their production to cope with the dry season. They are used to a dry season every year, but they noticed it was getting worse," Skidmore says.

Ranchers talk about "the accordion effect," she notes. "Every year the animals gain weight in the rainy season, they lose weight in the dry season, and then they gain weight again. This takes a toll, of course, but they had been able to make do with the dry season as it was. As it got worse, the weight loss got worse, and they were seeing animal losses and profit losses."

Skidmore visited Brazil as a Fulbright scholar and conducted focus groups with ranchers to gain insights into their motivations. Back in the U.S, then at the University of Wisconsin, she had access to a large database of all cattle movements in Brazil, including sales and transport. She combined nine years of cattle data with climate data, and her results confirmed what the focus groups had indicated.

"I do find evidence of increased animal sales in preparation for an extreme dry season. A rancher who would keep their animals in their own pasture through a normal dry season will instead will be more likely to sell them if they expect that the dry season will be severe," she says.

Focus group findings indicated that ranchers make decisions about the upcoming dry season by observing rainfall patterns. During the rainy season, it rains every day. Then it becomes intermittent, and ranchers will observe how sporadic the rain gets and how early it happens.

Ranchers have various options when they anticipate an extended dry season.

"They can sell the animals for slaughter, and then it is no one's responsibility to feed anymore. But potentially you have an animal that isn't at a weight for slaughter yet," Skidmore says. "Then you can sell the animal to a confinement operation, where they are feeding an animal on grain. This decouples the food source from the current weather; it can be grain that was grown in the region in the previous season, or grain that's being transported from another region."

Confinement operations finish an animal much faster than a pasture-based operation. Thus, there will be an initial increase in cattle supply, but the supply then falls the following year, leading to supply peaks and troughs.

Skidmore says her findings also indicate the region's pasture-based production is generally susceptible to drought because many pastures are degraded and quickly become unproductive. Furthermore, current production technologies are not equipped to deal with heat stress. The animals are outside in direct sunlight; there is no shade and no water sprinkling for cooling. Thus, investing in better management practices to improve pastures and deal with heat stress could benefit the region.

The research contributes to understanding how livestock producers are adapting to extreme weather events, Skidmore states.

"A lot of the climate change literature looks at crop producers. But the difference is that animals have lives, and this opens up a whole other set of adaptive strategies to livestock producers. Ranchers are making use of that, and it can really affect the structure of the supply chain," she concludes.

Skidmore collaborated on the project with the Connections between Water and Rural Production team led by Katrina Mullan, associate professor of economics at the University of Montana.

The paper, "Outsourcing the dry season: Cattle ranchers' responses to weather shocks in the Brazilian Amazon," is published in the *American Journal of Agricultural Economics*.

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