

## Exploring a U. S. Without Livestock

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What would happen if U.S. farmers stopped producing animals for food? Many have called for a move in that direction to address increasing concerns about U.S. health, eating habits, and climate change. A recent study calculated the impact of eliminating animal agriculture from the U.S. (<http://www.pnas.org/content/114/48/E10301>). Shifting land usage from food animal production to food crop production increased the total U.S. food supply by 23 percent. But what would the food supply look like? The U.S. now imports 51% and 39% percent, respectively, of the fruits and vegetables that we eat in the U.S. Limitations to growing these crops include climate, suitable soils, and the availability of water. In the study, we assumed that if farmers could profitably grow more of the high value crops, they would already be doing so. In the study, the types of food crops planted to tillable land formerly used for livestock were kept in the same proportions that those crops represent in our current system. Accordingly, most of the additional food produced would include high-calorie crops like corn and soybeans. The 415 million acres of permanent pasture and rangeland would go out of food production.

A complete shift away from food animal production would present major challenges to meeting America's nutritional needs. With no meat, milk, eggs, fish, or cheese in our diets, the U.S. population would not receive enough of several different essential dietary nutrients from the unsupplemented foods that would be available. Eliminating food animals would increase deficiencies in calcium, vitamins A and B<sub>12</sub> and some important fatty acids. The last are important as they may help to reduce cardiovascular disease and improve cognitive function and vision in infants. Animal food products are the only available, non-supplemental sources of some fatty acids and vitamin B<sub>12</sub>. Different types of carefully balanced diets -- vegan, vegetarian, omnivore -- can meet a person's needs and keep them healthy, but this study examined balancing the needs of the entire nation with the foods we could produce from plants alone. There's a difference between what's possible when feeding one person versus feeding everyone in the U.S.

Eliminating food animals from U.S. production reduced greenhouse gas emissions from agriculture, but not by the full 49 percent of agricultural emissions that animals currently estimated to contribute. Greenhouse gas increases associated with producing additional food crops, including producing synthetic fertilizer to replace manure, counterbalanced these reductions. Total U.S. greenhouse gas emissions dropped by 2.6 percent without farmed animals.

A take-home message from the study was that we need to expand the way we think about food production to account for the complex consequences of changing any individual piece within the wider food system.

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