

Existing cropland could feed four billion more

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The world's croplands could feed 4 billion more people than they do now just by shifting from producing animal feed and biofuels to producing exclusively food for human consumption, according to new research from the Institute on the Environment at the University of Minnesota.

Even a smaller, partial shift from crop-intensive livestock such as feedlot beef to [food](#) animals such as chicken or pork could increase agricultural efficiency and provide food for millions, the study says.

"We essentially have uncovered an astoundingly abundant supply of food for a hungry world, hidden in plain sight in the [farmlands](#) we already cultivate," says graduate research assistant Emily Cassidy, lead author of the paper published in *Environmental Research Letters*. "Depending on the extent to which farmers and consumers are willing to change current practices, existing [croplands](#) could feed millions or even billions more people."

Demand for crops is expected to double by 2050 as population grows and increasing affluence boosts [meat consumption](#). Meat takes a particularly big toll on food security because it takes up to 30 crop calories to produce a single calorie of meat. In addition, crops are increasingly being used for biofuels rather than food production. This study sought to quantify the benefit to food security that would accrue if some or all of the lands used to produce animal feed and fuel were reallocated to directly produce food for people.

To get at that question, Cassidy and colleagues first mapped the extent and productivity of 41 major crops between 1997 and 2003, adjusting numbers for imports and exports and calculating conversion efficiencies of animal feed using U.S. Department of Agriculture data. The researchers assumed humans need an average of 2,700 [calories per day](#), and grazing lands and animals were not included in the study. Among the team's findings:

- Only 12 percent of crop calories used for [animal feed](#) end up as calories consumed by humans.
- Only 55 percent of crop calories worldwide directly nourish people.
- Growing food exclusively for direct human consumption could boost available food calories up to 70 percent
- U.S. agriculture alone could feed an additional 1 billion people by shifting crop calories to direct [human consumption](#).
- When calculated on the basis of protein rather than calories, results were similar. For instance, of all plant protein produced, 49 percent ends up in human diets.

In addition to the global findings, the research team looked at allocation of crop calories in four key countries: India, China, Brazil and the U.S. They found that while India allocates 90 percent of calories to feeding people, the other three allocate 58 percent, 45 percent, and 27 percent, respectively.

Noting the major cultural and economic dimensions involved, the researchers acknowledged that while a complete shift from animal to plant-based diets may not be feasible, even a partial shift would benefit [food security](#). Quantifying the impact of various strategies, they found that a shift from crop-intensive beef to pork and chicken could feed an additional 357 million people, and a shift to nonmeat diets that include eggs and milk could feed an additional 815 million people.

The researchers emphasized that they are not making diet prescriptions or recommendations, just pointing out opportunities for gains in food production. They noted that humans can completely meet protein needs with plant-based diets, but that crop systems would need to shift (e.g., toward more production of protein-rich legumes) to meet human dietary needs.

"The good news is that we already produce enough calories to feed a few billion more people," Cassidy says. "As our planet gets more crowded or we experience disasters like droughts and pests, we can find ways of using existing croplands more efficiently."

Provided by University of Minnesota

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