

# Beef for billions

Sometime on October 31, the 7 billionth human on earth will be born. How do we feed a population that is likely to catapult to 9 billion when 1 billion of us are already malnourished? Jerry Taylor has a suggestion: Let them eat beef.

By Jerry Taylor's 10th consecutive meal of Argentine BBQ and Malbec red wine, his body was begging for some roughage. It was his fifth day of busing to Argentina's remote cattle farms. In the name of research, Taylor sampled each harvest.

"It was like Groundhog day," said Taylor, Wurdack Chair in Animal Genomics in the MU College of Agriculture, Food and Natural Resources. "We were all fat little pigs by the time we were done with it."

Taylor traveled to Buenos Aires to present at the World Angus Secretariat meeting, a conference where the world's Angus breeders meet to discuss research and technology transfer opportunities. Part of this discussion included a tour to visit some of the most progressive Angus breeders in Argentina.

Now back at the University of Missouri's Animal Science Center, Taylor is resuming a less glamorous form of beef research, DNA sequencing. He is one of a growing number of scientists who are using new biotechnology to identify which genes spawn feed-efficient animals. By identifying the genetic merit of cows, farmers could breed calves to be marinade-ready sooner and at lower cost than their counterparts.

Feed-efficient cattle can eat two pounds less food each day and take less time to reach processing weight, reducing the demand for grain and the cost of production, Taylor said. On the national scale, this would significantly decrease the amount of grain that winds up in the feedlot, as opposed to in our gas tanks or directly on our plates.

## Feeding the world

Scientists believe that the world's population will continue its growth spurt well after the [7 billionth person](#) is born on October 31. Current estimates claim that already [nearly one billion](#) of these people are undernourished. As many of the developing nations are experiencing more than double the birth rate of developed countries, their local food suppliers are helpless to try and meet the swelling demands. Subsequently, they will look to nations like the U.S. for cheap, abundant food.

The U.S. Department of Agriculture has made it a priority to allocate competitive research funds to maintain food security in the U.S. The USDA's National Institute for Food and Agriculture has begun granting research funds to improve feed efficiency in farm animals—essentially producing more meat with less green (plants and cash). By

reducing the share of grains that are dished out to livestock, more is leftover for the rest of us.

“A lot of the demand pressure in feeding the world comes from population increases,” said Nicholas Kalaitzandonakes, the director of MU’s Economics and Management of Agrobiotechnology Center. Kalaitzandonakes said when crops become feed, there is an even greater squeeze on our limited resources. “We are already cultivating most of the land we can use for crop production,” he said.

Corn has become one of the most debated crops on the market, with food manufacturers, ethanol producers and feedlots all vying for each arable acre.

“It’s the top crop in the U.S.,” said Ken Colombini, communications director for the [National Corn Growers Association](#). Colombini said corn’s versatility contributed to its meteoric rise in value—the U.S. corn crop is valued [higher now](#) than it has ever been in history.

“There are estimates that 4,000-4,500 different products can be made from corn,” Colombini said. “That makes it tricky when you have a few bad years.”

Currently, fuel and animal feed are winning the tug-o-war over food. According to recent [USDA estimates](#), only 1.4 billion bushels of corn end up in food products or plastics, while 5 billion and 4.8 billion go to ethanol and feed, respectively. Of this feed, cows are feasting on the lion’s share. Beef cattle consistently digest more corn than poultry, hogs or their dairy counterparts.

### **Where’s our beef?**

Likely, heading to China, Taylor says. In the past few years, China has gorged itself on foreign beef. In 2010, China’s beef imports grew [152 percent](#) from the previous year, and more than 40,000 tons came from the U.S., almost double from the year before.

“In general, as countries gain wealth, their diets improve, and meat is one of the first things they tend to increase consumption of,” said Kenneth Mathews, a cross-commodity analyst for the USDA Economic Research Service. “China looks like they’re going to be importing more, and as many people as there are, that could be a huge market.”

And very likely, Missouri meat will account for a large portion of these Chinese plates. This week, Gov. Jay Nixon closed another \$100 million export agreement with the Zhejiang Province of China, bumping the total export agreements to \$4.6 billion.

“Missouri businesses and farmers have and sell the products needed to feed and fuel and clothe the world,” Nixon said in a recent [AP report](#).

“A lot of what’s going to go on those 747s is beef,” Taylor said. Missouri’s inventory currently stocks almost 4 million beef cows—the state is currently the [6th largest](#) producer in the nation. “It’s about as many as are present in the entire British Isles.”

To Taylor, the growing interest in Asian exports sounds all too familiar. He recalls hunting for prime beef in his native Australian supermarkets, only to be met with sticker shock once he finally found a slab up to snuff. Australia had opened beef trade with

Japan, and apparently, the Japanese have delicate palettes.

“They don’t want our lower quality product,” said Taylor of the foreign demand for Grade-A cuts. “You just couldn’t find high-quality beef anymore, and we weren’t competing with other Australians to purchase quality beef.”

Taylor said his research is important for international trade.

“We want to sell beef to China,” Taylor said, stressing the debilitating debt the U.S. currently owes to its creditors. “But we’ve got to do it in a way that we can maintain quality beef for American consumers. We need to maintain the research here that will ensure food security for American consumers.”

### **The science of better beef**

Taylor is one of three research team leaders who have been granted up to \$5 million from the USDA-NIFA Agriculture and Food Research Initiative to dedicate to improving livestock feed efficiency.

Over five years, Taylor’s team will gather DNA samples from 8,000 individually fed beef animals, and will map out the genes they need to test for. Once they have genotyped these animals, researchers can go on to sequence the genomes of efficient and inefficient animals to identify which genes possess variants that matter for feed efficiency.

“The last five years has revolutionized the genetic analysis of all species,” Taylor said. “Just the cost of sequencing alone used to cost \$20 million. Today, my lab sequences an animal’s genome in 10 days for \$5300.”

Researchers will hand this information over to companies that develop and sell DNA tests to cattle farmers, who will be able to selectively breed for feed efficiency. Every two pounds less fed each day saves \$40 per animal. Taylor said if the feed efficiency of all U.S. fed beef cattle could be improved by this amount, farmers and feedlots could save up to \$1 billion per year in production costs.

“It’s a cumulative process,” Taylor said of selective breeding. “It won’t happen overnight, but these estimates are certainly quickly attainable. The whole mean efficiency of the population will change.”

### **Food for us, food for them**

As populations and incomes in developing countries continue to grow, their arms will continue to reach into nations where food is cheap and plentiful. According to Kalaitzandonakes, because of continued food research and exponential production rates, the U.S.’s food security is one of the most enviable in the world.

“The reason [Americans are] spending 10 percent of our budget today on food, and not 25 percent like other generations, is because of food innovation,” said Kalaitzandonakes. “If we’re going to be producing more food, we need more technology, not more use of land and water.”