



CONSUMER PROTEIN

"TRENDS" and TRUTHS

IMPACT ON ANIMAL AGRICULTURE AND SOY PROTEIN DEMAND

Terms like “plant-based protein,” “no antibiotics ever” and “low carbon footprint” are popping up on menus and in grocery stores more frequently. The appeal of such labels stems in part from **common negative assumptions** about animal agriculture.

Where do such assumptions about raising and consuming meat, poultry and dairy come from? **Are they accurate?** And what do current trends mean for soybean markets, since feed represents the single largest demand for soy?

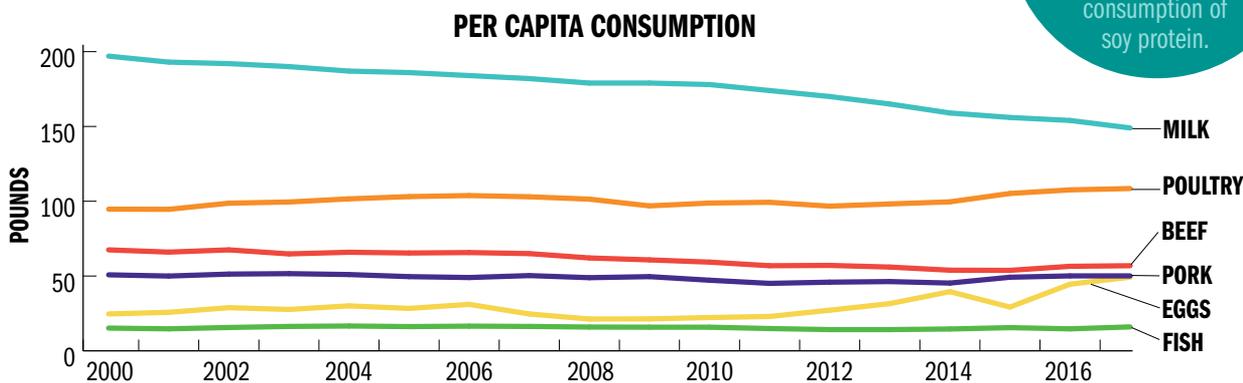
Here’s a look at several current consumer trends and their potential impact on soybean markets.



"AMERICANS ARE EATING LESS MEAT."

Protein consumption actually fluctuates depending on the economy, according to a January 2018 MarketWatch article. Consumer demand is correlated to employment factors and disposable income, and **animal protein consumption remains steady.**

1.6 POUNDS
2016 per capita consumption of soy protein.



Sources: USDA data and estimates; Soy Nutrition Institute



"NON-GMO IS THE WAY TO GO."

Nielsen data indicates that **food sales – including meat – labeled non-GMO grew more than \$8 billion** from 2012 to 2016. According to Technavio, the global non-GMO animal feed market will experience an estimated 7.51% compounded annual growth rate between 2019 and 2023. Soybean producers have opportunity to grow more non-GMO soybeans for this market segment.



"MEAT ALTERNATIVES WILL REPLACE LIVESTOCK PRODUCTION."

"Plant-based protein" appeared in some form on most lists of food trends to watch in 2019. And food companies continue to invest in "lab-grown" or "cultured" meat. Will the technology behind these efforts supplant traditional meat production?

Food and agricultural economist Jayson Lusk, Ph.D., head of Agricultural Economics at Purdue University, studies what we eat and why we eat it. "Right now we are seeing many different protein trends, and we don't yet know what will prevail," he says. "Economics and consumer acceptance will be key factors in the future of meat alternatives."

He notes company investments in meat alternatives indicate this market will grow because so many are betting on it. At the same time, consumer research currently shows customer aversion to these products. But both factors could change.

COMPETITIVE ECONOMICS

"Prices signal resource use – nothing is free," Lusk explains as he compares the production systems for traditional meat and meat alternatives. "In the U.S., we currently have very cost-effective systems to produce pork and poultry. Feed and other resources are inputs for high-quality meat. The feed conversion efficiency of these systems makes it harder for meat alternatives to compete economically."

"Beef is more expensive because it requires more resources, including time, so alternatives may be more competitive in this area," he continues. "But beef also uses marginal land and converts resources we can't eat – grass – into something we can."

Current costs for lab production are astronomical. But, Lusk says that as the technology begins to use more common resources and creates a more efficient system, those prices will drop.

"It's hard to predict, but given known factors related to product investments and costs, along with consumer preferences, I think meat alternatives could claim up to 15 percent of the protein market in 15 years."

What does that mean for the feed industry?

"Any replacement of traditional meat production by alternatives impacts the feed industry," Lusk explains. "If alternatives claim 15 percent of the market, that would be a 15 percent reduction in feed grain demand."

Nearly 97 percent of the soybean meal used in the U.S. feeds poultry, pigs, cattle, fish, companion animals and more. A soybean meal demand assessment commissioned by the soy checkoff estimated that animal agriculture used 31.2 million tons of soybean meal in 2017. A 15 percent reduction in feed demand would equal a decrease of nearly 4.7 million tons of meal from almost 197 million bushels of soybeans.

OUT-OF-THE-BOX OPPORTUNITIES

The two dominating trends in meat alternatives could create new competition and opportunities for soy protein, notes Lusk.

Plant-based protein garners significant investments and headlines. Consumer preference for soy as a plant-based protein is mixed. Some sources list soy at the top of plant-based proteins, like an April 2018 Medical News Today article.

Other voices in this space debate the merits of soy compared to peas, lentils and other legumes, or specifically promote avoiding soy. Beyond Meat, one well-known brand, currently uses mostly pea protein in its products.

Lusk believes cell-based meat, like that being developed by Impossible Foods' fermentation process, will take longer to be commercially available, but considerable work is going into reducing costs and improving products.

"Those cells have to eat something," Lusk says. "Some processes currently use fetal bovine serum, but researchers want to replace that medium with other proteins. We don't know how that will develop, but soy could have a place there."

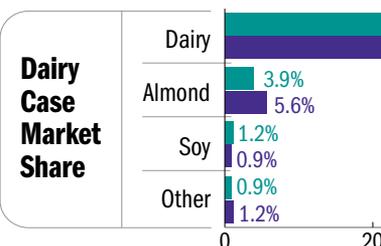
However, he doesn't envision the disappearance of traditional meat production soon. "While we don't know the comparative efficiencies of new systems because they use proprietary technologies, we do know that they aren't yet working to produce T-bones or bacon."

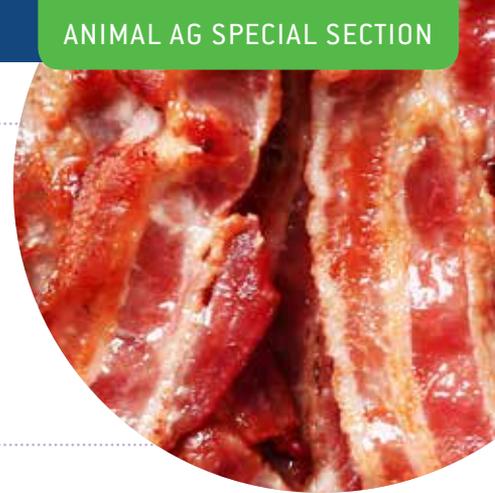
So, as meat alternatives become more mainstream, they are **not yet poised to replace traditional meat production**. For soy, traditional feed demand will continue while new opportunities develop.



"MILK ALTERNATIVES BEAT DAIRY."

Traditional dairy provides a source of complete protein and uses nearly 2.9 million tons of soybean meal a year. Soy milk may be the most common alternative, using protein from an estimated .8 million bushels of soybeans. However, the growing popularity of highly processed almond, barley, hazelnut, oat, rice, walnut and other milks is **cutting into demand for both dairy and soy milk** – and by extension, soy protein.





"BACON MAKES ANYTHING BETTER."

From baconfests and Wendy's Baconator, to statement tees and lip gloss, **bacon has developed a cult following** in the U.S. Its popularity has contributed in part to the long-term forecast from the USDA expecting pork production to increase annually for the next decade, though at a slower rate than recent years. Pork production consumes about 7.6 million tons of soybean meal annually.



"POULTRY SHOULD NOT BE RAISED WITH ANTIBIOTICS."

Research shows that specialty production systems, such as using no antibiotics, **reduce poultry feed efficiency** between 2 and 12 percent. Every 1 percent decrease in feed efficiency for U.S. poultry production as a whole requires an additional 95,000 tons of soybean meal.

Source: CoBank Knowledge Exchange



"WILD-CAUGHT FISH AND SEAFOOD ARE MORE NATURAL."

Wild-caught fisheries cannot sustain global seafood demands, according to the U.S. Soybean Export Council. By 2030, an additional 41 million tons of fish per year will be needed to maintain current levels of seafood consumption. Responsible fish farming, often labeled **"responsibly raised" or "farm-raised," fills the gap between wild supply and consumer demand** with a low ecological footprint, protecting wild stocks. Aquaculture produces seafood higher in omega-3 fatty acids from their feed, according to Johns Hopkins analysis. That diet for many species includes soy, cost-effectively replacing unsustainable fishmeal.



"I'M A _____."

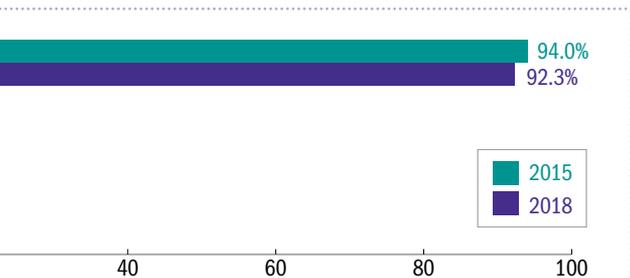
Term	Definition
Vegan	No animal products
Seagan/Peagan	Fish-eating vegan
Vegetarian	No meat
Pescatarian	Fish-eating vegetarian
Lacto/Ovo Vegetarian	Vegetarian plus no milk or eggs
Reductarian	Eats less meat and animal products
Flexitarian	Vegetarian that occasionally has meat or fish

Source: Leah McGrath, BuildUP Dieticians



"GRASS-FED BEEF IS ENVIRONMENTALLY RESPONSIBLE."

All beef cattle feed on grass for most of their lives. But currently, pastureland can only support finishing 27 percent of the beef supply, according to Harvard University research. **Grain-finished cattle fulfill beef demand more efficiently**, prevent overgrazing and consume more than 1.4 million tons of soybean meal.



Source: American Farm Bureau Federation



"LIVESTOCK ARE A PRIMARY SOURCE OF GREENHOUSE GAS EMISSIONS."

One sunny Chicago afternoon, a local sports talk radio host confidently asserted that gas from cows is killing the planet. This offhand comment from a mainstream thought leader outside food demonstrates the reach of the assumption that livestock are a major source of greenhouse gas emissions, producing more pollution than transportation.

According to Frank Mitloehner, Ph.D., professor and air quality extension specialist with the University of California, Davis, this false assumption stems from a 2006 report, "Livestock's Long Shadow," from the Food and Agriculture Organization (FAO) of the United Nations, which has since been rejected by its senior author.

"The report asserted that 18 percent of greenhouse gas emissions came from livestock, a higher percentage than transportation," Mitloehner says. "That raised many questions for me."

He dug into the report, and uncovered key inconsistencies. "That FAO report used different types of analyses for different industries, meaning they weren't comparing apples to apples," he explains. "The livestock data used a lifecycle assessment, accounting for all inputs and emissions from every step in producing a steak or glass of milk. The transportation data only included emissions from vehicle tailpipes. That is not an accurate comparison."

Mitloehner adds that the way many media and activist groups read that data conflated global and regional numbers, creating further inaccuracies. "In sharing findings from that report, many took global emission totals and applied them to a region or country," he says. "Assuming that the global total for any emissions category applies to the U.S. creates problems. Transportation is much different in the U.S. than in Europe or developing countries. The same is true for livestock production. The U.S. is the most efficient producer of meat and dairy products in the world."

He also found that most statements share only gas production (i.e., emissions) from activities such as raising dairy or beef, ignoring the amount of greenhouse gases destroyed through natural processes like oxidation, which are most important.

All this contributes to a skewed environmental livestock story. Misunderstanding the role of feed crops further twists the narrative.

"Livestock effectively use land and feed that people can't to produce high-value, nutritious food," Mitloehner says. "And the nutritionally dense feed used in the U.S. contributes to our improved efficiency."

CORRECTING ANALYSIS

Mitloehner addressed his concerns by working closely with FAO and other organizations to create new global standards to measure and analyze greenhouse gas emissions. According to this protocol, a much different picture of the livestock industry's contribution to greenhouse gas emissions emerges.

He points to current data for the U.S. from the Environmental Protection Agency (EPA). Burning fossil fuels accounts for about two-thirds of U.S. greenhouse gas emissions. Electricity creates 30 percent of emissions, followed by transportation at 26 percent and industrial production at 21 percent.

"All agriculture, both plants and animals, accounts for about 9 percent of our greenhouse gas emissions, and livestock alone accounts for less than 4 percent of the total," Mitloehner says. "If everyone in the country was vegan, greenhouse gas emissions would fall only 2.6 percent. Food waste is a much bigger contributor to emissions than farming."

Mitloehner's globally accepted analysis, based in science and legitimate comparisons, challenges assumptions about the environmental cost of animal agriculture. He explains that production intensity and emissions intensity are inversely related.

"Greater efficiency in livestock production reduces carbon footprint," he says. "For example, the U.S. produces 60 percent more milk than in 1950 with 16 million fewer cows. That decreases the carbon footprint of a glass of milk by about two-thirds."

He says that according to the data, U.S. meat, poultry and dairy products have a "low carbon footprint per unit of product." But this story needs to be told to combat the negative assumption that eating less red meat and dairy could save the planet.

Learn more about livestock and air quality by following Mitloehner on Twitter, @GHGuru.

