

Improving pulse production for a sustainable food future



Headline Issues

- > Not enough pulse crops are produced for healthy diets and projected growth of plant-based meat.
- > Improving production at lower-yielding pulse farms can benefit farmers and consumers.
- > Improving yields alone is insufficient to offset the overconsumption of animal protein.

The Center for Environmental and Animal Protection (CEAP) aims to provide academic leadership for research policy-making and addressing critical social issues at the intersection of environmental and animal protection.

Summary

Animal protein consumption is far above healthy or sustainable levels in high-income countries and is projected to grow elsewhere. Pulses are nutritious and environmentally-friendly protein sources, and are increasingly preferred as ingredients over soybeans in plant-based meat and dairy analogues.

Presently, not enough pulses are grown to meet healthy dietary recommendations. Additionally, by 2030, growth of plant-based meats may outpace pulse production.

Pulse producers have expanded their acres to meet demand, but yields per acre are stagnant. Improving yields in low-yielding areas is critical for meeting growing demand. Improving yields alone, however, will not offset a sufficient fraction of animal protein consumption. Investments in pulse crop breeding and other sustainability-aligned incentives are needed.

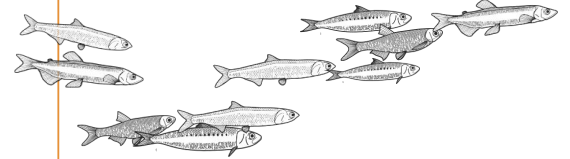
Pulses are low-fat, high-protein legume crops that are harvested for their dry seeds. They include dried peas, beans, chickpeas, and lentils.

Growth in meat and dairy defies recommendations to limit intake

Within the past 20 years, meat consumption has risen by approximately 50%, with growth predominantly in Asia, South America, and Eastern Europe. Demand in these regions is catching up to high-income countries where per-capita meat consumption is greatest. Globally, growth in meat consumption is expected to rise more than two thirds by 2050, with the steepest growth in low- and middle-income countries.

Public health recommendations urge consumers in affluent countries to reduce their dairy intake by half and meat by more than 70%. Meanwhile, average consumption of pulses should be more than four times higher in the US and twice as high globally. Overconsumption of red meat and dairy now also occurs in many middle-income countries, where heart disease and rates of obesity are rising despite stubborn malnutrition rates.

“The growth of plant-based meat and seafood could require more than twice as much pulse protein than is currently available in the North American food supply”



Plant-based substitutes are also growing

In the US, plant-based meat and dairy have grown by more than 10% per year, far higher than average food sales growth. Plant milk makes up 13% of total milk sales. Plant-based meats still only represent 2% of total meat sales. Sustained growth at this rate would give plant-based meat 9% market share by 2030. Pulses are increasingly being utilized over soy in novel formulations.

The plant protein sector has contributed to overall demand and expansion of pulses produced in the US and Canada, along with growth in demand in pet food, animal feed, and export markets to South Asian countries.

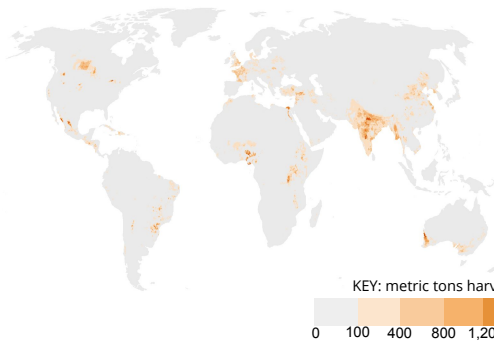
Producers are expanding pulse acreage rather than improving yields

In North America, pulse acreage has almost tripled within the past 20 years, while yields per acre have stayed virtually static.

Globally, the story is similar: increased production is primarily driven by expanding acreage globally. Pulse yields have grown in many regions, but not as much as those of cereal grains or soy.

By 2030, growth of plant-based meat and seafood could require more than twice as much pulse protein than is currently available in the North American food supply (3g per person per day). This would outpace historical growth in production, and may even result in unsustainable expansion of acreage if production does not replace animal feeds (e.g. soy) or expand into fallow rotations.

Pulses



Soybeans

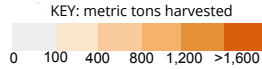
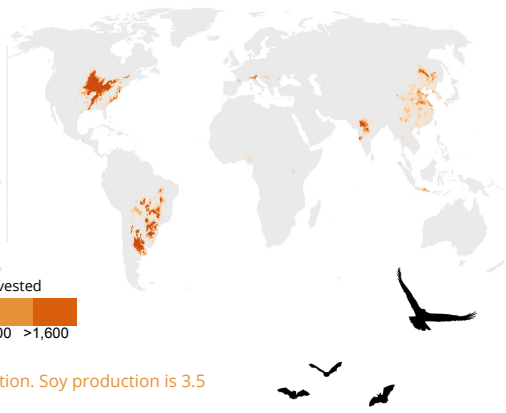


Figure 1. Global comparison of pulse and soy crop production. Soy production is 3.5 times greater than pulses. Source: Earthstat and UN FAO.

Research methods and data sources

This analysis covers production and global supplies of pulses, soy, and animal-sourced foods. Data used in modeling improved pulse yields comes from Earthstat and UN FAO. Improved yields were modeled using a statistical crop-climate approach described in Licker et al. (2010).

Data regarding animal consumption and imports, exports, feed, and losses of soy and pulses were taken from UN FAO commodity balance sheets.

Data is available online at Earthstat.org and <http://www.fao.org/faostat/>

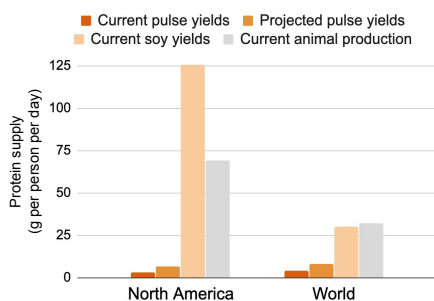


Figure 2. Pulse crop supplies at present and improved yields compared with soy (primarily animal feed) and animal protein (meat, dairy, and seafood). At improved yields, domestic North American pulse protein supplies would nearly double, but would still be only 9% of total animal protein and 5% of total soy protein. Source: original analysis using data from Earthstat.org and UN FAO.

“Improving pulse yields is critical for improving nutrition and sustainability, but more measures are needed in the long term.”

Supporting sustainable intensification

Globally, pulse yields remain well below soy. Pulses have not benefited from the same technological “green revolution” that have improved soy yields and contributed to its ease of management. Because farmers benefit from high yields, economies of scale, and demand for animal products that keep soy prices high, farmers rarely plant pulses in soy production areas (Figure 1).

Pulse yields could be improved through better management that brings underperforming areas up to high yields seen in similar climates. Yields could be improved by 14% in North America and by 41% globally. If none of this new productivity were fed to animals or exported, improved yields could nearly double the North American food supply of pulses (Figure 2).

Such improved pulse yields, however, would only provide 9% of the total protein from all animal-sourced in North America. Plenty of soy exists to substitute animal protein, but both consumers and plant protein manufacturers are likely to want more diversity for taste, nutrition, and allergy avoidance. Additionally, it is unknown how well-suited soy production areas are for substituting pulses, which tend to favor drier growing conditions than soybeans.

Conservation program support and insurance incentives should be directed to assisting farmers improve yields of pulses to avoid unsustainably expanding their acreage. Improving the yields of presently-available pulse varieties is critical for improving nutrition and sustainability, but more measures are needed in the long term. Effective measures should encourage growth in both the supply and demand for pulses simultaneously:

- **Reduce demand for animal products (meat, eggs, farmed fish) that contribute to high soy and cereal grain prices.**
- **Accelerate growth of novel plant-based proteins to stimulate pulse demand and displace a sizeable fraction of animal and feed crop production.**
- **Support farmer efforts to improve yields (production per acre) of pulses.**

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This research brief was prepared by Matthew N. Hayek, Assistant Professor, Department of Environmental Studies, New York University.

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