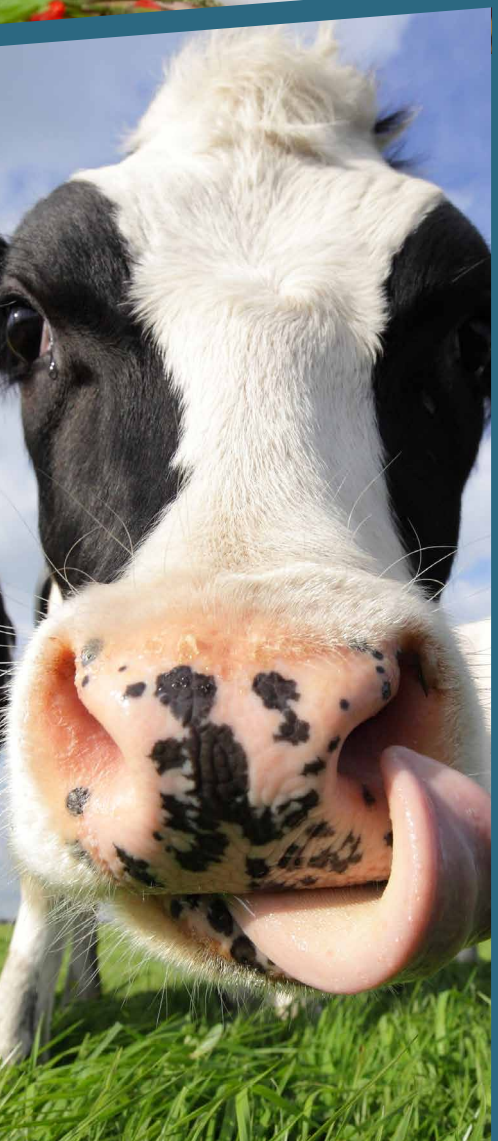
SUPPORTING U.S. FOOD & AGRICULTURE INNOVATION & CLIMATE OBJECTIVES

AGRICULTURE & FOOD SUPPLY CHAIN CONTRIBUTIONS



SUMMARY

The U.S. food system is:

- Sustainably produced
- Diverse & nutritious
- Leading boldly for the future

Safe, secure, affordable & accessible food supply

Hundreds of millions of Americans and people around the world rely on safe and nutritious U.S. agricultural products and foods. Americans have access to one of the safest, most diverse, most affordable food supplies in history[1], and the United States exports more than $135 billion worth of food and agricultural products every year, making core contributions to global food security and helping to meet growing global demand for food and feed.

According to the 2020 Global Agricultural Productivity (GAP) report, in order to sustainably double the amount of food, feed, fiber, and bio-energy needed to nourish nearly 10 billion people in 2050, "agricultural productivity needs to increase at an average annual rate of 1.73%."[2]

Thriving, resilient communities

The U.S. agriculture and food supply chain supports good jobs and strong communities and is a driver for sustainable economic growth and development. Total food and agricultural employment accounts for nearly 11% of U.S. jobs, many in rural communities where good-paying jobs are particularly important.[3] More than 98% of America's 2 million farms are operated by families, and at least 56% of farms have at least one female decision-maker.[4]

U.S. agriculture and food supply chain stakeholders are at the forefront of research and innovation (including in partnerships with the public sector and academia) to increase agriculture's resiliency in the face of supply chain disruptions from climate change, human and animal disease outbreaks, and/or other disruptions yet to come.

Leaders across the supply chain also give generously to help food-insecure Americans gain access to the nutritious foods they need, including by donating hundreds of millions of pounds of food to local and national food banks, as well as pet food for companion animals.

Built on efficiency and innovation

The U.S. agriculture and food supply chain has dramatically reduced its impact on the environment in recent decades, including by reducing greenhouse gas (GHG) emissions and optimizing land, water, and energy use, all while increasing food production for a growing population and working to reduce food waste.

Examples of achievements and commitments across the U.S. agriculture and food supply chain include:

Growing more food and feeding more Americans, using fewer natural resources

Thanks in large part to technology, new production practices and a commitment to continuous improvement.

- U.S. dairy has the world's lowest dairy GHG emissions per liter of milk produced.[1]
- Farmers and ranchers produce beef using 33% less land, 12% less water, and with a 16% smaller carbon footprint in 2007 compared to 1977.[2]
- Pork producers use 76% less land, 25% less water, and 7% less energy to produce twice as much pork.[3]
- Chicken producers use 72% less land and 58% less water, with 36% lower GHG emissions.[4]
- U.S. corn producers are committed to long term continuous improvements and targets for 2030 that will build on a history of producing more while using less and leaving little to waste. Corn producers grow more corn today using 41% less land per bushel than in 1980.[5]
- By 2025 (with a 2000 baseline), U.S. soy is committed to reducing land use impacts by 10%; reducing soil erosion by 25%; increasing energy efficiency by 10%; and reducing total greenhouse gas emissions by 10%. Farmers today grow 55% more bushels per acre of soy, with 41% less soil erosion, 44% lower greenhouse gas emissions, 46% greater land use efficiency, 34% less irrigated water, and 42% less energy compared to 1980.[6]

Proactively practicing soil health, maintenance, and conservation efforts

Efforts such as planting more cover crops, using more conservation tillage, and using more no-till methods preserve and increase nutrients, improve water quality, and trap excess carbon in the soil.

- 70% of U.S. soybean acres use conservation tillage, and 40% of U.S. soybean acreage is no-till.[7]
- 15% of all U.S. farmland is used for conservation & wildlife habitat.[8]
- Synthetic biology enables farmers to enhance soil health to grow more food on less land, manufacturers to create new food ingredients and alternative proteins, and industrial biotech companies to revolutionize manufacturing by optimizing processes for producing sustainable chemicals, biobased products, and biofuels.[9]

Planting modern seed varieties and optimizing nutrient stewardship

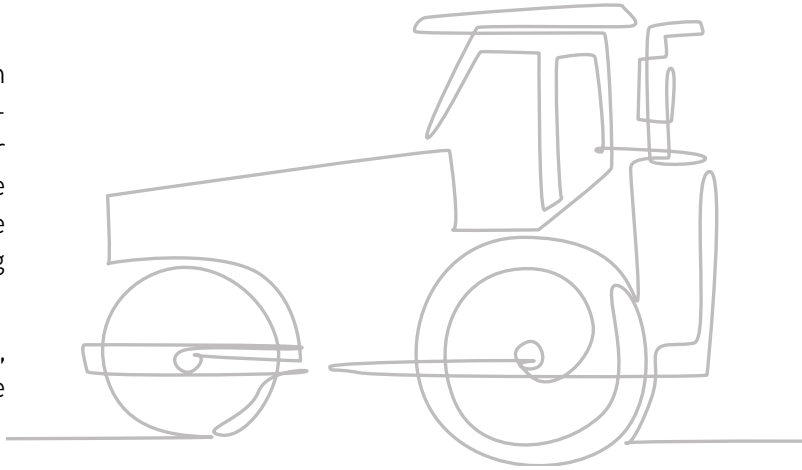
Using the right nutrients and the right seeds helps farmers produce a wide variety of consistent, high-yield crops with improved nutrition and environment benefits.

- Breeders have developed carrots with increased beta-carotene which improves the crop's appearance and nutrition profile.
- New seed varieties can help reduce food waste by yielding produce that stays fresh longer and has more consistent quality - like more uniform peppers, lettuces with longer shelf life, and smaller serving size varieties of produce like melons and avocados.
- Certain seed improvements allow for reduced pesticide use which by some estimates has reduced the environmental footprint associated with pesticide use by 19%.[10]
- Seed varieties developed for cover crops and grasses promote carbon sequestration and improve soil health, while seed varieties developed for conservation can restore land damaged by mining, forest fires or other environmental disasters.
- The 4R Nutrient Stewardship Principles[11] promoted and recognized by the fertilizer industry and the USDA Natural Resource Conservation Service provide a pathway to improved productivity and farmer profitability, improved water quality, and reducing GHG emissions.
- Case studies show the 4R principles at work. For example, one Illinois corn and soybean farmer reduced GHG emissions by 34%, improved nutrient use efficiency by 28%, and reduced cost of fertilizer management by $24 per acre.[12]

Harnessing the power of advanced technology

Biotechnology has enabled farmers to produce high quality, high-yielding crops that have a direct bearing on improved food security and poverty alleviation with increased production, while also increasing resilience to heat and drought.

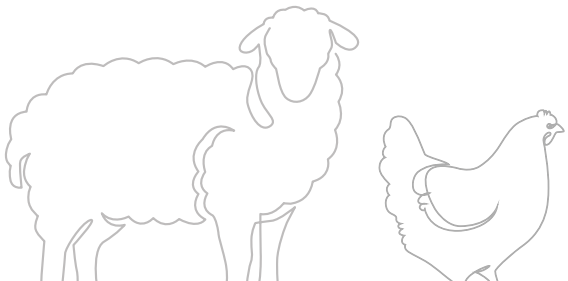
- Biotech crops, such as those that require no-tilling, have saved 27.1 billion kg of carbon dioxide, equivalent to taking 16.7 million cars off the road.[13]
- Biotech advancements allow for fewer blemishes, such as bruises, that lead to more sellable crops for farmers requiring less acreage. These technologies can also extend the shelf life of produce, cutting down on food waste, which creates eight percent of all global emissions.[14]
- Gene editing technology will play a vital role in making sure crops and livestock are more resilient to pests, disease, and extreme weather variabilities caused by climate change, while reducing the usage of agricultural inputs like pesticides, fertilizers, and water; and improving the nutritional value of food.[15]
- In a recent study published in Nature Plants, researchers used gene editing to increase the number of kernels on ears of corn.[16]
- Using gene editing, scientists have been able to modify the canopy architecture and root architecture of both sorghum and barley to improve water use efficiency.[17]
- Advancement in animal biotechnology has enormous potential to make livestock production more resilient and sustainable and help prevent, prepare, and respond to outbreaks of infectious diseases.



Continuously improving animal feed, animal health, and sustainable production of nutrient-dense foods like meat, poultry, dairy and eggs

As recognized in U.S. dietary guidance, nutrient-dense meat, poultry, dairy, and eggs are critical sources of essential nutrients including high-quality protein, calcium, phosphorus, potassium, iodine, and vitamins B2 and B12, which contribute to addressing all forms of malnutrition.

- Evidence shows diverse products provide the most cost-effective sources of critical nutrients - for example, dairy for calcium and vitamin D, grains for iron and magnesium, meat for protein and choline, fruits and vegetables for potassium and vitamin C.[18]
- U.S. beef, pork, poultry, lamb, and dairy producers are committed to develop transparent metrics and ambitious targets to further strengthen contributions to safe food, balanced diets, thriving communities, healthy and humanely treated animals, and the environment.
- U.S. dairy farmers lead the way on animal welfare standards, implementing the world's first dairy welfare standard to meet the International Organization for Standardization (ISO) Technical Specification requirements as set by the World Organization for Animal Health (OIE). The FARM Animal Care pillar boasts participation from 99% of U.S. domestic milk production and includes more than 31,000 dairy farm participants from more than 130 cooperatives and processors in 49 of the 50 U.S. states.
- Dairy companies representing 74% of U.S. milk production have adopted the U.S. Dairy Stewardship Commitment, a rigorous set of standards that demonstrate positive impact and contribute to U.S. dairy's ability to track, aggregate and report on progress. In 2020, the U.S. dairy industry made the commitment to be carbon neutral or better by 2050, while also optimizing water use and improving water quality.[19]
- The animal health industry is working to improve prevention and treatment to help reduce the burden of disease on livestock around the world, including by developing new and innovative vaccines, alternatives to antibiotics, digital veterinary care technologies, improved diagnostic tools, and new methods of parasite control to combat the impact of climate change.
- In 2019, America's domestic livestock and pets consumed nearly 284 million tons of safe, high quality and nutritious food, which not only helps to keep the U.S. food supply chain stable, but also supports the economic growth of rural communities through the purchases of farm products. Innovative new feed ingredients help optimize nutrient absorption and protect the environment. For example:
  - » The use of feed additives for ruminant livestock, has been demonstrated to reduce methane levels produced by ruminants by up to 30 percent.[20]
  - » Phytase is used in roughly 90% of poultry diets and 70% of swine diets and promotes better water quality by reducing excess phosphorous in manure.
  - » Probiotics aren't just for humans - when used in chicken feed, probiotics allow good bacteria in the gut to thrive, keeping chickens healthy and growing with less feed.
  - » Amylase helps chickens and piglets better digest sugar and starch, so they eat less corn.
- The U.S. animal food industry also helps close the food supply cycle and reduces food waste that would otherwise end up in landfills.
- More than 40% of U.S. animal feed ingredients are byproducts from other production processes, such as soybean oil and dried distillers' grains,[21] and pet food makes use of nutritious ingredients left over from human food production (e.g., unsold bakery or brewery items or wholesome parts of the animal that people do not eat).
- Diverting food waste away from landfills is a key goal of the Food Waste Reduction Alliance, including through partnership with the U.S. Environmental Protection Agency.[22] Nearly 90% of food waste from frozen food facilities is repurposed for animal feed.[23]



Supporting diet diversity, reducing waste, and sourcing ingredients sustainably

The Dietary Guidelines for Americans explicitly emphasize that a healthy dietary pattern is not a rigid prescription. Americans need a variety of foods to make tailored and affordable choices that meet their personal, cultural, and traditional preferences.

- Americans throw out 25% of the food they bring home. Frozen foods are nutritious, often lower in cost-per-serving, and are a waste solution. They have a much longer shelf life than fresh or refrigerated foods and can be stored and used when needed, allowing for portion size flexibility.[24]
- Emotional and physical well-being are interrelated[25], and healthy diets must take both into account. As a proud collaborator with the Partnership for a Healthier America (PHA), the U.S. confectionery industry has committed to make half of individually wrapped products in packages that contain 200 calories or fewer by 2022, empowering consumers to make informed choices that satisfy their emotional well-being needs one treat at a time. Progress is tracked and verified by the Hudson Institute and published by PHA.[26]
- U.S. confectionery companies are leaders in sustainable sourcing of ingredients, with company examples including achievement of deforestation-free palm oil supply chains and sustainable cocoa sourcing.[27]

4R Nutrient Stewardship

Partners: The Fertilizer Institute

4R Nutrient Stewardship is a framework for implementing nutrient management best practices to increase cropping system productivity, improve on-farm economics, optimize nutrient use and reduce nutrient loss to the environment via water and air pathways (including GHG mitigation). The 4R framework pursues using the right nutrient source, at the right rate, the right time and in the right place. In the US, farmers implementing the 4Rs have achieved nitrogen use efficiencies that are (on average) double that of their global peers and 50 percent improved beyond their US peers. While being more efficient, they have been able to double corn and wheat yields beyond their global peers and achieve 20 percent improved yield beyond their US peers. 4R practices can include (but are not limited too) improved soil testing, precision agriculture, data-based recommendations and use of enhanced products.

More information: www.4Rfarming.org

Hatching Hope

Partners: Cargill Inc., Heifer International

Hatching Hope uses a market systems approach to achieve this goal by (1) supporting smallholder poultry farmers to improve production, (2) supporting markets to meet the needs of smallholder poultry farmers and poultry product consumers, and (3) supporting consumers in understanding the nutritional value of poultry products.

More information: https://www.hatchinghopeglobal.com

National Dairy FARM Program

Partners: National Milk Producers Federation

The FARM Program is U.S. dairy's industry wide, on-farm social responsibility program that provides assurances that U.S. dairy farmers are global leaders in animal care (UN SDG 9 and 12), antibiotic stewardship (UN SDG 9 and 12), biosecurity (UN SDG 9 and 12), environmental stewardship (UND SDG 13, 14, and 15), and workforce development (UN SDG 8 and 12), all as part of a One Health approach. FARM is the world's first dairy first dairy welfare standard to meet the International Organization for Standardization (ISO) Technical Specification requirements as set by the World Organization for Animal Health (OIE). The FARM Animal Care pillar boasts participation from 99% of U.S. domestic milk production and includes more than 31,000 dairy farm participants from more than 130 cooperatives and processors in 49 of the 50 U.S. states.

More information: https://nationaldairyfarm.com

U.S. Net Zero Initiative

Partners: Innovation Center for U.S. Dairy, Dairy Management Inc, Nutrient, U.S. Dairy Export Council, International Dairy Foods Association, National Milk Producers Federation

The Net Zero Initiative (NZI) launched in 2020 as an industry-wide effort to accelerate voluntary action on farm to reduce environmental impacts by making sustainable practices and technologies more accessible and affordable to U.S. dairy farms of all sizes and geographies. This is achievable through research, on- farm pilots, development of manure-based products and ecosystem markets, and other farmer technical support and opportunities. The primary expected outcomes include 1) the collective U.S. dairy industry advances to net zero carbon emissions by 2050 and makes significant improvements in water use and quality, 2) in addition to continuing to provide nutrient-dense foods and beverages, dairy farms provide products and services that enable other industries and communities to be more sustainable, and 3) farmers are able to realize the untapped value on-farm, making the system of continuous improvement self-sustaining.

More information: https://www.usdairy.com/getmedia/5dfcdf05-c7bc-40ca-b6d0-a5e74702f20d/earth-day-fact-sheetv8.pdf

Rethinking Methane

Partners: University of California, Davis, CLEAR Center

Methane (CH4) is a potent greenhouse gas that is 25-28 times stronger than carbon dioxide (CO2) - the primary greenhouse gas driving climate change in California - but how it influences actual warming is much different, according to research released by UC Davis professors Frank Mitloehner, Ph.D., and Ermias Kebreab, Ph.D., along with Michael Boccadoro, executive director of Dairy Cares. The publication, "Methane, Cows, and Climate Change: California's Dairy's Pathway to Climate Neutrality," examines recent literature from leading climate scientists and its implications for the California dairy sector.

More information: https://clear.ucdavis.edu/news/methane-cows-and-climate-change-california-dairys-path-climate-neutrality

Studying the Impact of GM-Free Livestock and Poultry Feed on U.S. Feed Industry

Partners: Institute for Feed Education & Research

The livestock, poultry and aquaculture industries have used genetically modified feed ingredients for more than 20 years. Research to date has not demonstrated any health risks to those humans who have consumed food containing GM products or from animal food products from animals fed GM ingredients in feed. However, calls to remove GM ingredients from feed in the name of greater sustainability pose a threat to the feed and food industries, particularly in continuing to provide choices in the marketplace. The results of this proposal are likely to underscore the environmental and economic impacts of going GM-free in U.S. feed production. Several other agricultural organizations will be assisting to fund this important project.

More information: https://ifeeder.org/research/#toggle-id-1

Trust in Animal Protein

Partners: North American Meat Institute, National Pork Producers Council, National Pork Board, American Feed Industry Association, Beef Alliance, Dairy Management Inc., Elanco, National Corn Growers Association, United Soybean Board, U.S. Meat Export Federation, U.S. Roundtable for Sustainable Beef

Trust in Animal Protein (TAP) unites animal protein producers, packers, and processors in the largest-ever effort to increase trust and grow demand for animal protein through a program of proactive continuous improvement and communications over the next 10 years, focused on wholesome animal protein sustaining healthy animals, thriving communities, safe food, balanced diets, and our environment.

Tyson Foods Food Donation Efforts

Partners: Tyson Foods

Tyson Foods, Inc. has donated more food over the past year than ever in its 85-year history, the company reported today. More than 30 million pounds, or the equivalent of 120 million meals, were donated by the company during the last 12 months to fight hunger. The food donations were part of more than $75 million the company invested to fulfil its commitment to address hunger insecurity, support its team members and improve the quality of life in the communities where it operates.

More information: https://www.tysonfoods.com/who-we-are/giving-back/hunger-relief

Upward Academy & Upward Pathways

Partners: Tyson Foods

Upward Academy helps team members develop important life skills, offering free and accessible classes in English as a Second Language (ESL), High School Equivalency (HSE), U.S. citizenship, financial literacy and digital literacy. Pathways is an in-plant career development program that provides frontline team members with job skills training and workforce certifications at no cost.

More information: https://www.tysonsustainability.com/workplace/helping-team-members-succeed

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