



Agriculture in America Sustainability

REPORT 2017

★ U.S. Farmers & Ranchers Alliance® ★



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Today's SMART Farm strives to be sustainable utilizing science and technology to be faster and more efficient, while still growing and producing the world's best food supply. The result is sustainable practices that produce more food on less land, provide better care for animals, fewer trips across the field and more precise application of crop inputs like fertilizer and pesticides. These are the issues both farmers and consumers care about.

A Message from the Chairman and CEO of USFRA

U.S. Farmers & Ranchers Alliance (USFRA) is proud to share the agricultural industry's first-ever sustainability report, which highlights examples of sustainable practices happening on farms and ranches today all across the nation.

In examining existing food and agriculture industry sustainability focus and metrics, we identified a need to bring forward the voice of the farmer and rancher. USFRA represents a coalition of commodity and farm groups and agri-business, but equally important, we partner with food and retail companies as representatives of the farmers and ranchers who raise and cultivate our food. We want to help color in what sustainable food production means, and practical applications of how it comes to life in U.S. agriculture.

This sustainability report builds on key insights from recent USFRA research that aims to identify and gain a clearer understanding of consumers' perception of sustainability in U.S. food and agriculture. Through this research, we found that consumers struggle to define sustainability. Moreover, the topic is best understood by consumers when we explain the tangible ways they are improving the water, soil, air and habitat on and around our farms and ranches.

USFRA's Agriculture in America Sustainability Report demonstrates how farmers and ranchers are seeking and implementing practices that allow them to better protect the planet's resources while efficiently producing food.

To compile the report, USFRA collaborated with numerous agriculture organizations, as well as individual agriculturalists, regarding ongoing sustainable farming practices from across the nation. We are grateful for the time everyone invested in order to share information about the important and innovative sustainability practices they each are employing to positively impact the environment on today's modern farms. This report also highlights research conducted by those same agriculture organizations and commodity groups.

Ultimately, we are hoping to demonstrate how farmers and ranchers are working every day across the nation to meet the needs of today's society through innovative practices and processes, while improving the land, soil, water and habitat for future generations. The one consistency you will see throughout this report is that we are producing more food with less resources. This is a true representation of American farming, and **this is Sustainable Agriculture.**



Brad Greenway
Chairman,
U.S. Farmers &
Ranchers Alliance



Randy Krotz
CEO, U.S. Farmers &
Ranchers Alliance

A handwritten signature in black ink that reads "Brad Greenway".

Brad Greenway
Chairman, U.S. Farmers & Ranchers Alliance

A handwritten signature in black ink that reads "Randy Krotz".

Randy Krotz
CEO, U.S. Farmers & Ranchers Alliance

The Challenge: Understanding the Current Sustainability Communications Landscape

Sustainability as it relates to food and agriculture, has become a hot topic among industry players, as well as media and the general consumer. But, defining what it means to grow and produce food sustainably continues to take many forms and encompasses a wide range of touch points. To identify the current conversations surrounding sustainability in modern agriculture, and uncover misperceptions of agricultural production practices, USFRA conducted a six-month media and communications audit of U.S. news coverage from leading national, regional, trade and online publications.¹ The outcomes are paraphrased below:



The Struggle to Define Sustainability:

Media and consumers alike are unclear how terms like “natural,” “local,” “organic” or “conventional” fit into the definition of sustainable food, if at all. *The Charlotte Observer* notes, “In a time when we argue about what it means when menus claim to be ‘local,’ when farmers would rather call their agricultural methods ‘sustainable’ than wrestle with the regulations of the word ‘organic,’ it’s getting harder to define what anything means beyond ‘this is what it means to me.’”



Perceptions of Organic:

Organic farming practices are touted as the “gold standard” for consumers when it comes to sustainable food in the media. *The Boston Globe* posts that “The organic label is constantly evolving, but it still remains the gold standard for sustainable agriculture.”



SMART Farm:

Precision agriculture and big data are 21st century tools farmers and ranchers utilize in order to grow and produce their food more efficiently and sustainably. *The Economist* states, “Precision agriculture is one of the technologies that could help to feed a world whose population is forecast to hit almost 10 billion by 2050.”



Company-Specific Initiatives:

New sustainability announcements and initiatives from companies including Dannon, McDonald's and Unilever have made headlines in recent months. In one example, *Minneapolis Star Tribune* comments that "Land O'Lakes is responding to increased demands from consumers wanting to know more about where their food comes from, retailers that market those products and farmers that want to improve crop yields and livestock and dairy production without degrading soil or water quality."



Regulation:

Media coverage explores how government intervention in agricultural practices — either at the state or federal level — impacts sustainability. This includes climate change initiatives (i.e. limiting carbon footprint), state and federal labeling laws, and USDA/FDA definitions of "organic" and "natural." *The Boston Globe* on regulation: "The Organic Foods Production Act of 1990 began to shift public perspective, and today that small green and white certified organic badge has become a signifier of purity in the eyes of many consumers. As written, the legislation allows for some hydroponic production, but in recent years, soil farmers have pushed back as they've watched the organic label crop up in places they never imagined."



Lifestyle:

Media trends position at-home gardening, home-grown food, and farm-to-table restaurants as sustainable options for consumers. Also, the tourism industry is jumping on the bandwagon; hotels, cruise liners, and expedition companies are promising locally-sourced food, eco-friendly accommodations and other "sustainable" amenities. *The Arizona Republic* cites: "Sustainability is about not consuming a lot. Nearly 25 percent more Americans grew their own food in 2015 than in 2008, and food-growing households in urban areas increased 29 percent, from 7 million in 2008 to 9 million in 2013, according to the National Gardening Association."

The Farmer & Rancher Sustainability Survey

In March 2017, farmers and ranchers from across the country – representing both crop and livestock production – were surveyed to better understand their perceptions regarding environmental sustainability and agricultural practices. Approximately half (52%) of the survey respondents currently raise both crops and livestock, while another 31% raise crops only and 18% raise only livestock.

Farmers and Ranchers are focused on sustainability, but believe their customers, including those in the food industry, have little understanding of how their practices affect sustainable food production.

Key Survey Findings



81% of farmers/ranchers agree that customers of U.S. grown crops and livestock are growing **more concerned and focused** on the environmental sustainability of the products they buy



87% of farmers/ranchers believe the practices currently used on their operations **met the environmentally sustainable production standards** demanded by end-users like food companies, restaurants and manufacturing companies



74% of farmers and ranchers believe the agriculture industry has **reached a level of environmental sustainability** in production of U.S. grown crops and livestock that should satisfy food companies



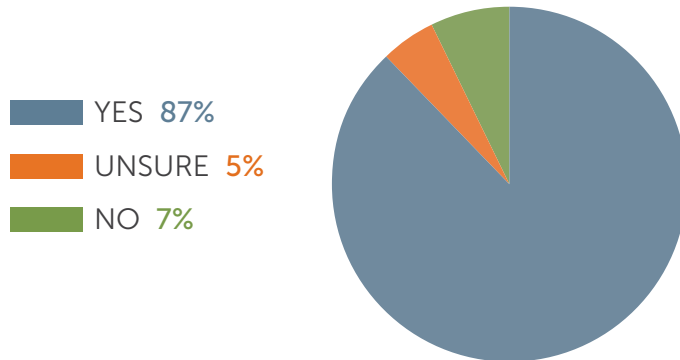
63% of farmers/ranchers believe the food industry understands that U.S. agriculture has become **increasingly more sustainable** in the last 10 years



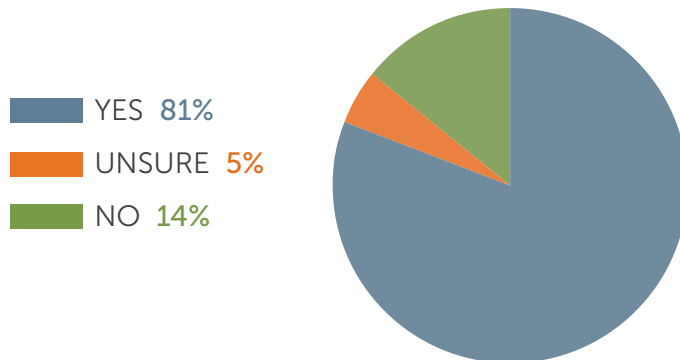
68% of farmers/ranchers don't believe the food industry understands enough about how **food is grown and raised** to demand that certain practices be used by farmers and ranchers

Top Survey Questions & Results:

Do you believe the practices currently used in your farming and/or ranching operation meet the environmentally sustainable production standards demanded by end-users like food companies, restaurants, and manufacturing companies?

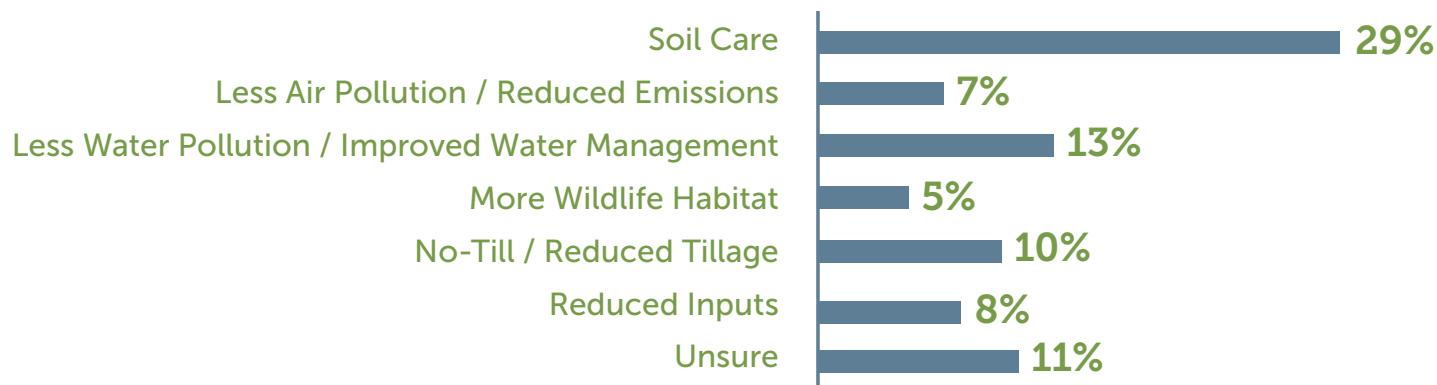


Are customers of U.S. grown crops and livestock growing more concerned and focused on the environmental sustainability of the products they buy?

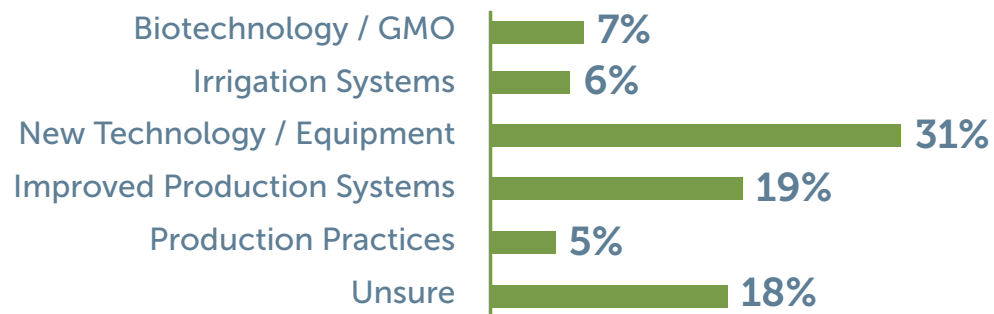




What is the most significant change in your operation over the last ten years that has allowed you to have more of a positive impact environmentally, on and around your farm?

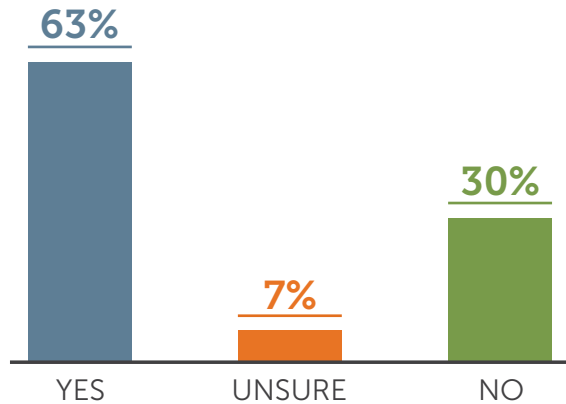


What advancements have occurred that allowed you to do this?

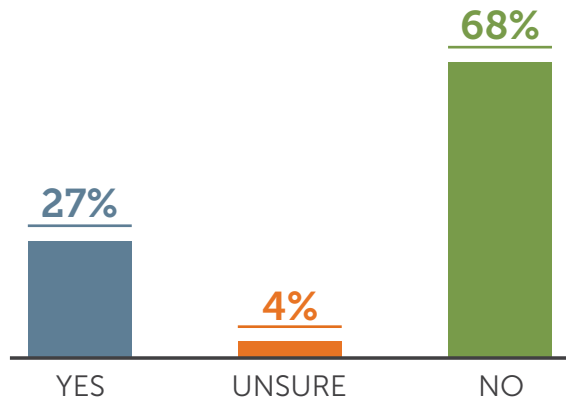




Do you think the food industry understands that U.S. agriculture has become increasingly more environmentally sustainable over the last ten years?

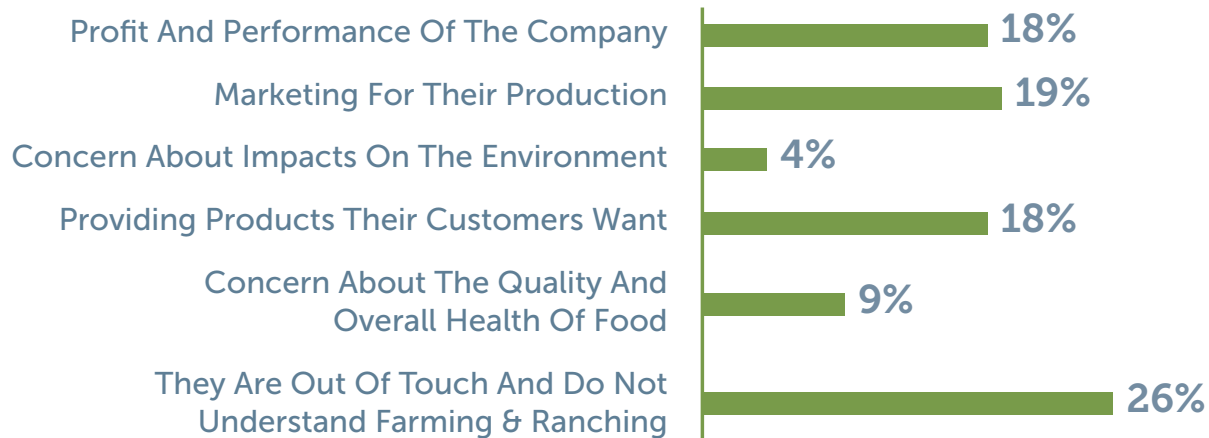


Do you think the food industry understands enough about how food is grown and raised to demand that certain practices be used by farmers and ranchers?

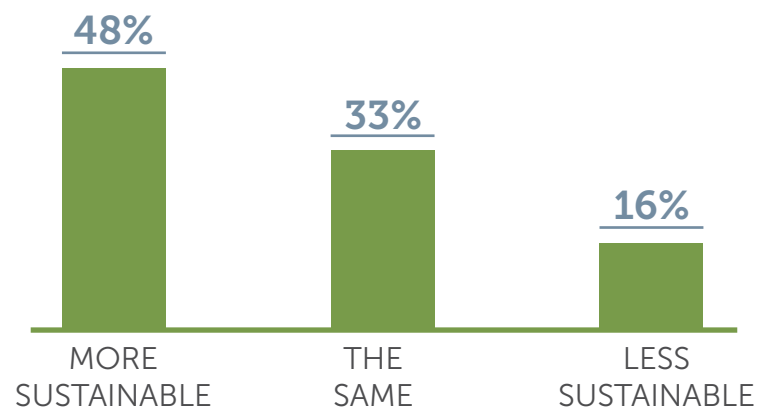




When it comes to the focus food companies are placing on environmental sustainability, which of the following best describes why you believe food companies are so focused on the issue of environmental sustainability?



Do you think conventional operations for growing crops are more sustainable, less sustainable, or just as sustainable as organic operations?



Technology, Sustainability & Agriculture Overview

Today, more than any other period in history, Americans are vocally concerned about the environment. This concern has manifested itself in the consumer marketplace with an increased demand for foods that are produced in environmentally sustainable ways. But, what exactly does that mean?

For those growing and raising food in America, sustainable farming has been the foundation of their operations. **It's simply the way farmers and ranchers – past and present – work to preserve and protect the livelihood of their family businesses, and more importantly, the air, soil, water and habitat on their farms and in their communities.** As consumers' demand for sustainably-grown food intensifies, farmers and ranchers in the U.S. are using data and technology to become more efficient, nimble, and more equipped to protect the planet's resources while producing food.

Across agriculture as a whole, air, soil, water and habitat are key focus areas when evaluating sustainability on a farm. However, different commodities have specific sustainability metrics and inputs based on what crop or livestock they raise or farm. USFRA has compiled a sampling of the nation's top commodity and livestock groups' priority inputs and indicators for sustainable farm and land management.



Key Commodities Overview & Topline Inputs



SOYBEANS

Soybean farmers in the United States are focused on being good stewards of natural resources and have been utilizing sustainable practices on their farms for years. American soybean production is based on a national system of sustainability laws and regulations. These standards, combined with careful implementation of best practices are observed by nearly 500,000 of the nation's soybean farmers.²

The United Soybean Board encourages farmers to continually improve their production systems and products to meet customers' evolving sustainability requirements. In accordance with the U.S. Soybean Sustainability Assurance Protocol (SSAP)², **U.S. farmers are committed to implementing new production practices to continuously improve on-farm sustainability**. The SSAP is a certified aggregate approach audited by third parties that demonstrates sustainable soybean production on a national scale. This protocol is only one part of the overall U.S. soybean producer sustainability program.



**More than 90%
of U.S. Soybeans
are grown
sustainably³**

Key Facts & Figures

American soybean farmers are thinking about the future - from the soil to the air and water - as they are increasing their sustainable practices. Below are some of their methods³:

Soybean acres are under continuously rotated plantings, contributing to increased biodiversity, pest control and disease prevention. Soybeans replace vital nutrients in the soil, reducing the need for chemical fertilizers.



Soybean farmers use a number of conservation practices such as: no-till, grass filter strips, cover crops and drainage water management, among others to manage one of their most precious resources – water.



U.S. soybean farmers use GPS and computer monitors in their farming equipment to track yield and inputs. That way, they can change seeding and application rates down to square inches, ensuring that they put the perfect amount of seed, fertilizer and other inputs on the field. This helps farmers to work most efficiently, minimizing inputs and costs and maximizing yields.



² <https://soygrowers.com/wp-content/uploads/2013/02/US-Sustainability-Assurance-Protocol-March-2013.pdf>

³ <https://unitedsoybean.org/media-center/issue-briefs/sustainability/>

More on Sustainable Soybean Practices

A study conducted by Field to Market measures agricultural sustainability by how efficient the industry is in five core areas. The study shows that **soybean farmers grow 46% more soybeans now than they did 30 years ago** while also making these improvements (per bushel)⁴: (1980-2011)

Five Core Areas:



35%

ENERGY

decrease (BTU of energy used per unit of production)



47%

SOIL LOSS

decrease (tons of soil loss per acre)



33%

IRRIGATION

decrease in water used (acre-inches of water applied per bushel)



44%

GREENHOUSE GAS EMISSIONS

decrease (pounds of carbon dioxide equivalent per bushel)



40%

LAND

use decreased (acres per unit of production)

Future Sustainability Goals



The United Soybean Board focuses on four primary areas for continually evolving the sustainability of U.S. soy by 2025⁵:

- **Reducing land** use impact by **10%** (acres per bushel)
- **Reducing soil erosion** an additional **25%** (acres per bushel)
- **Increasing energy** use efficiency by **10%** (BTUs per year)
- **Reducing total greenhouse gas emissions** by **10%** (pounds CO₂-equivalent gases emitted per year)

⁴ <https://fieldtomarket.org/national-indicators-report-2016/soybeans/>

⁵ <http://ussec.org/wp-content/uploads/2016/03/20160531-SSAP.pdf>



BEEF

Sustainability is hard to define. Depending on their commodity, every group has a different definition of sustainability. The beef industry defines sustainability as meeting growing global demand for beef by balancing environmental responsibility, economic opportunity and social diligence throughout the supply chain.⁶

Key Facts & Figures

Innovation and enhancements in management and practices have led to major improvements in sustainability, such as⁷:

32% reduction in occupational illnesses and accidents



10% improvement in water quality



7% reduction in landfill contributions



3% reduction in water use

2% reduction in resource consumption and energy use



2% reduction in greenhouse gas emissions



More on Sustainable Beef Practices

Beef production involves more complex biological processes than any other food system, taking anywhere from 2-3 years to bring beef from farm to fork. The beef community is also not vertically integrated, meaning that an animal will change owners or caretakers an average of 2-3 times during its lifetime. The completion of the first-of-its-kind beef **life cycle assessment (LCA)** – certified by NSF International –

⁶ <http://beefresearch.org/CMDocs/BeefResearch/Sustainability%20White%20Papers%20and%20Infographics/SustainabilityExecutiveSummaryWeb1.pdf>

⁷ <https://factsaboutbeef.com/2013/09/30/raising-beef-isnt-sustainable-its-more-sustainable-than-you-think/>

in 2011 required the entire beef value chain to work together to account for inputs and outputs.⁸

This research examined the sustainability of the entire beef supply chain from pasture to plate and beyond. In addition, it also reviewed the impact of food waste on sustainability. That cooperation between segments marks a new chapter for the beef community and demonstrates the industry's commitment to a path of continuous improvement. The beef industry believes that sustainability is a journey, not a destination. According to the beef industry LCA — from 2005 to 2011 — the beef industry improved environmental and social sustainability by seven percent.⁹

Common Beef Sustainability Questions

Q: Is local beef more sustainable?

A: The term “local” simply reflects the distance a product has been transported before being marketed and does not necessarily reflect differences in production practices or sustainability. The environmental sustainability benefit of purchasing local beef products are likely minimal as, **1)** transportation accounts for only 1-3% of GHG emissions per unit of beef, and **2)** local beef products can decrease transportation distance. Although, often at the expense of increased frequency of shorter distance trips due to smaller beef delivery sizes. Therefore, GHG emissions from the burning of fossil fuels per unit of beef may not be greatly impacted.⁹

Q: How does the carbon footprint of U.S. beef compare to global beef?

A: The U.S. beef industry has one of the lowest carbon footprints in the world due to cattle genetics, the quality of cattle feeds, animal management techniques, and the use of technology.¹⁰

Future Sustainability Goals

In its ongoing commitment to continuous improvement, the beef industry has made specific sustainability goals⁶:

- **Continue** to improve management of cattle and resources to promote improved efficiencies
- **Optimize** the use of distillers grains in diets
- **Continue** to optimize manure management techniques to reduce fertilizer inputs
- **Continue** to optimize biogas recovery systems, closed loop water cooling systems and waste water recovery systems in packing plants

An estimated 40% of all food produced in the United States is wasted, contributing to losses in efficiency across the entire food value chain. Although beef waste is about 20% of consumable product, it is still a significant burden and represents a major opportunity to improve the sustainability of the beef industry. By cutting beef waste in half, the full beef value chain would achieve an approximate 10% improvement in full-chain sustainability.

⁸ <https://factsaboutbeef.com/2014/08/27/the-beef-lifecycle-from-farm-to-fork/>

⁹ http://beefresearch.org/CMDocs/BeefResearch/Sustainability_FactSheet_TopicBriefs/Fact_Sheet_8_Local_Beef.pdf

¹⁰ http://beefresearch.org/CMDocs/BeefResearch/Sustainability_FactSheet_TopicBriefs/ToughQuestions1-Carbon.pdf



DAIRY

In terms of sustainability, America's dairy farmers have long been active stewards of the environment. Dairy farmers are doing more with less to conserve resources and the land, and technological advances are aiding in continuous sustainability improvement. The National Milk Producers Federation and Dairy Management, Inc. created the **(FARM) Program** to aid in the industry's sustainability efforts. The FARM Program is comprised of dairy farmers, cooperatives and processors across the United States.¹¹

In 2017, **98% of the nation's milk supply** came from farmers who use the FARM program guidelines.



Today, the dairy industry produces 59% more milk with 64% fewer cows. Dairy farmers are doing more with less to conserve resources and the land.¹³

Key Facts & Figures

Compared to 70 years ago, today's dairy farmers have achieved the following¹²:



¹¹ <http://nationaldairyfarm.com/about-farm>

¹² <https://www.midwestdairy.com/wp-content/uploads/2015/10/Sustainability-Key-Messages.pdf>

¹³ <https://www.environmentalleader.com/2013/12/dairy-industry-sustainability-advances/>

More on Sustainable Dairy Practices

Today's dairy farmers are embracing technology and SMART Farming to lessen their environmental impact. For example, to enhance water conservation, dairy farmers are reusing water about 5-6 times every day, to clean milking parlors and irrigate fields.⁸ In addition, methane digesters convert manure, food waste and other organic matter into biogas. Farmers are then using that biogas to power parts of their dairy operation. The excess energy from the methane digesters can be sold to the electric grid in their area.¹⁴

Future Sustainability Goal

The dairy industry has made a commitment to reduce its carbon footprint **25% by the year 2020**. Currently, they are almost halfway to their goal; in 2014 reports show that the dairy industry had already **reduced their carbon footprint by 11%**.¹⁵



2009



2014

11%

Reduction



GOAL – 2020

25%

Reduction



¹⁴ <https://www.midwestdairy.com/wp-content/uploads/2015/08/SustainabilityFactSheet.pdf>

¹⁵ <https://sustainability.dairygood.org/>



POULTRY/EGG

Since the middle of the 20th Century, the broiler industry started as primarily local businesses, and has grown to a successful, nationwide supply chain that feeds consumers in the U.S. and around the globe. As the world population and consumer demand for white meat grows, poultry farmers are put in a unique position. They have had to greatly increase their output, while continuously decreasing their carbon footprint.¹⁶

Key Facts & Figures

Egg and poultry farmers are continuously improving production practices to be more efficient and sustainable while enhancing animal care and welfare. Below are top examples¹⁷:

Egg and poultry farmers are continuously improving production practices

Hens use a **little over half the amount of feed** to produce a dozen eggs



32% less water is used to produce a dozen eggs



27% more eggs are produced per day and are living longer



A vast majority of hens' manure is recycled for crop production

¹⁶ http://www.realtruthaboutchicken.com/docs/realtruthaboutchickens_infographic.pdf

¹⁷ <http://www.aeb.org/food-manufacturers/eggs-product-overview/why-eggs/98-cwhite-papers/469-bthe-egg-sustainability>



If egg farmers in 2010 were using the same methods they did in 1960, farmers would need 78 million more hens, 1.3 million more acres of corn and 1.8 million more acres of soybeans to be used as feed.¹⁶

More on Sustainable Poultry/Egg Practices

In the early days of the commercial poultry industry — around the 1940s — each chicken required approximately 16 pounds of feed to achieve a four lb. weight. Today, that amount of feed has been reduced by more than half — less than seven pounds of feed — to grow the same size bird, all without the use of growth hormones or steroids. Similar gains have been achieved in turkey production. It once took 29 weeks for a tom (male) turkey to reach a live weight of 35 pounds. Today, the male turkey tips those scales in just 15 weeks.

Lower feed requirements reduce the demand for corn and soybeans.

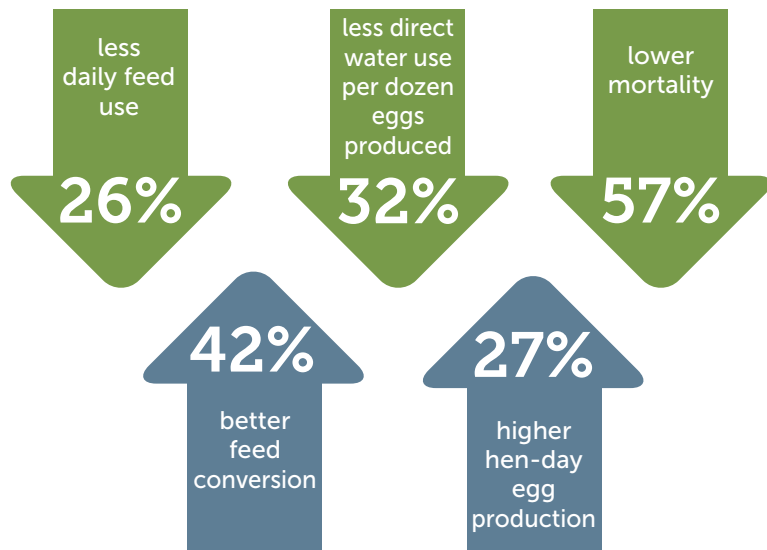
This efficiency also aids in reducing the fuel consumption and exhaust emissions of the tractors and trucks that harvest and bring the grain to market.

A study was initiated by the egg industry aimed to formally quantify production performance gains and overall reduction in environmental

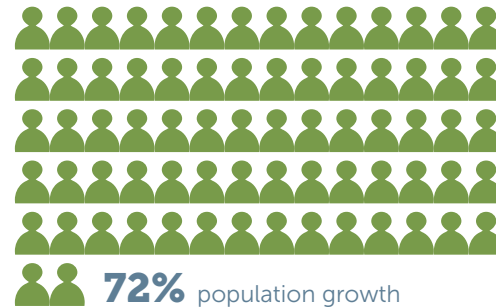


impact. The study, titled **"A Comparative Assessment of the Environmental Footprint of the U.S. Egg Industry in 1960 and 2010"**, was undertaken by the Egg Industry Center (Iowa State University, IA). Comparing 1960 to 2010, the following changes in production performance of pullets (young hens) and laying hens in the United States were observed over time. Compared with 1960 laying hens, 2010 laying hens have 26 percent less daily feed use, 27 percent higher hen-day egg production, 42 percent better feed conversion, 57 percent lower mortality, and 32 percent less direct water use per dozen eggs produced. The total supply of 77.8 billion eggs produced in the U.S. in 2010 was 30 percent higher than the 59.8 billion eggs produced in 1960. However, the total environmental footprint for 2010, in million metric tons of emissions, is 63 percent lower for GHG emissions.¹⁵

2010 laying hens have:



The human population **increased 72%** over the last 50 years, the hen supply has **increased by only 18%.**



Future Sustainability Goals

To keep up with growing population and demand, the poultry and egg industry has set the following goals:

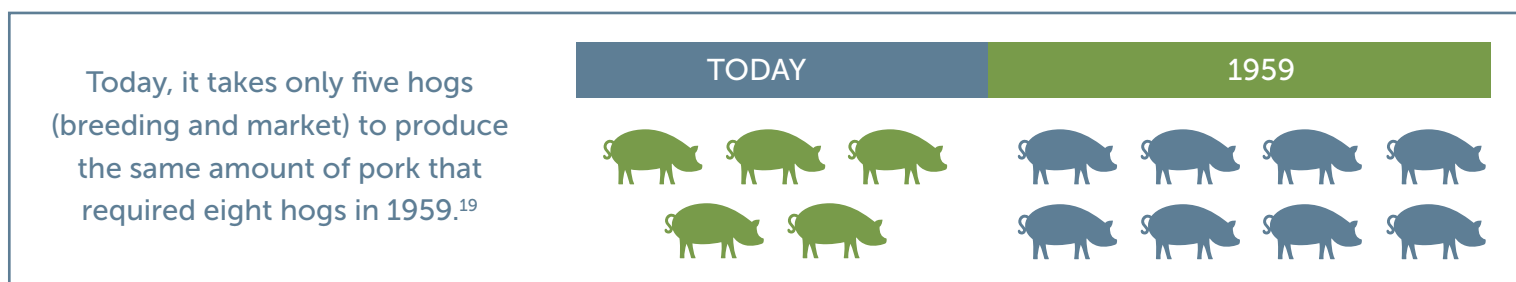
- **Provide 60% more** animal-sourced foods
- **Using innovations** and not adding hens, which will save 113 million tons of feed, 65 million acres of land and 74 billion gallons of water





PORK

In 1959, the pork industry produced about 12.1 billion pounds of pork. By 2009, that number had almost doubled, to **22.9 billion**.¹⁸ Sustainability is key as the pork industry continues to meet increasing demands while caring for its animals, protecting the environment and preserving natural resources for generations to come. Prioritization of sustainable production practices has enabled the industry to achieve successful growth, making production practices today more efficient than ever before.



Key Facts & Figures

In the past 50 years, the pork industry has¹⁸:

Decreased water usage by **41%**
per pound of pork produced



Decreased land usage by **78%**
per pound of pork produced



Improved feed efficiency by **33%** / lb.
carcass weight



Decreased carbon emissions by **35%**
per pound of pork produced

More on Sustainable Pork Practices

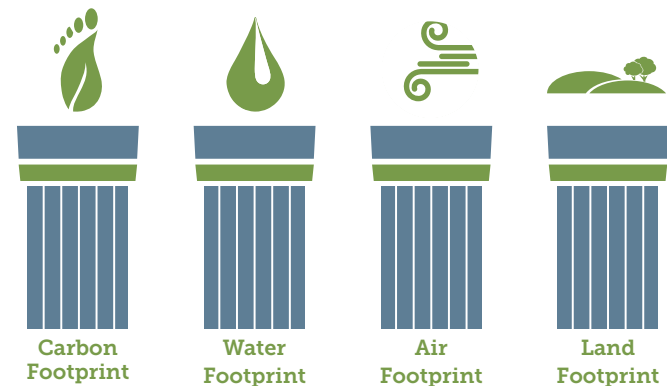
The pork industry has established a “**Sustainable Pork Framework**” that defines sustainability in raising swine, and defines key indicators to provide metrics for benchmark performance. This framework lays the groundwork for identifying improvement strategies and aspirational goals. Areas include human health and safety, animal welfare, environmental stewardship and economic integrity.²¹

The Sustainable Pork Framework closely aligns with the pork industry’s We CareSM initiative, “an overarching philosophy and set of ethical principles. It guides America’s pork producers to do what comes naturally to them – demonstrating their commitment to maintaining a high standard for safe food, animal well-being, public health, natural resources, employee care and community.”²⁰

The principles include:

- **Produce** safe food - Protect public health through a commitment to farm and food safety
- **Protect** and promote animal well-being through farmer-led standards and training programs
- Ensure practices to protect public health
- **Safeguard** Natural Resources in all their practices through our Four Pillars of Environmental Sustainability
- **Provide** a work environment that is safe and improvement through best practices, continuous research and education
- **Contribute** to a better quality of life in our communities

Through Pork Checkoff, the industry has invested in research around the **Four Pillars of Environmental Sustainability** pertaining to carbon footprint, water footprint, air footprint and land footprint of pork production. Using a life cycle assessment (LCA) looking at pork production to identify processes to increase efficiency and reduce environmental impacts thereby improving profitability and sustainability of the pork industry.



The Pork Checkoff research and life cycle assessments have led to development of the Pork Production Environmental Footprint Calculator. The calculator aids producers in identifying potential areas for operational changes to improve efficiencies and reduce carbon, water, air and land footprints.

Future Sustainability Goal

The pork industry has **set goals for 2020** to **reduce carbon and water footprints** of pork production **as a whole by 5%** using a 2014 baseline.

²⁰ <https://www.slideshare.net/trufflemedia/mr-allan-stokes-the-sustainable-pork-framework>

²¹ <http://porkcdn.s3.amazonaws.com/sites/all/files/documents/Water%20Fact%20Sheet%20f.pdf>



CORN

Corn, a worldwide staple, is one of the only crops that is **grown in nearly all 50 states**. American corn farmers are committed to meeting sustainability challenges through careful stewardship of the land, constant improvements in technology and advanced production methods. Corn farmers are committed to bettering their land for the future of their farms, families and the environment.

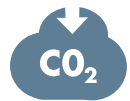
Key Facts & Figures

Since 1980, the corn industry has been working to improve their environmental impact. These are a few of their successes:

Soil loss per bushel of corn has
decreased **68%**



The energy used to produce a bushel
of corn has decreased **44%**



Corn production has seen a **36%**
decrease in greenhouse gas emissions
per bushel



Corn yields have increased **64%**

More on Sustainable Corn Practices

Corn farmers are constantly looking for ways to improve environmental sustainability; some of their major concerns are soil health and preserving their farms for future generations. To reach key nutrient reduction goals, corn farmers are partnering with their state associations to voluntarily submit individual sustainability goals and metrics to a nationwide database. Corn farmers are looking to track their yearly sustainability goals and successes. Additionally, the National Corn Growers Association (NCGA) is partnering with the Honey Bee Health Coalition, and the Keystone Monarch Collaboration for enhanced pollinator health and habitat.

What is the Soil Health Partnership?

To aid corn farmers in keeping their soil healthy, NCGA created the Soil Health Partnership (SHP) initiative. The SHP is an initiative to identify, test and measure management practices to improve soil health and benefit farmers' operations. SHP is building upon the work of farmers in implementing innovative management practices to provide connections between on-farm practices and improved soil health.

Future Sustainability Goals



NCGA is working with American corn farmers to reach specific sustainability goals by 2020. These goals are aided in part by the SHP program. By 2020 NCGA plans to:

- **Increase the number** of corn farmers who input sustainability data by 300%
- **Facilitate a 20% increase** in the use of integrated pest management
- Work with state affiliates to **support continuous improvement** in water quality and overall sustainability
- **Work with state affiliates** to promote soil health initiatives in 10 states by 2020 and support expanded best management practices in water quality and water conservation in all affiliated corn states
- **Establish** at least one national research initiative that expands the understanding of crop improvement through genetic enhancement





SUGAR BEETS

The United States is one of the world's leaders in sugar beet production. Since the mid-90s, sugar beets have accounted for about 55% of sugar production according to the USDA. Though the number of sugar beet farms have decreased, the average area harvested per farm increased due in part to expanded sustainability efforts from today's sugar beet growers. Currently, sugar beets are one of the essential raw materials for manufactured sugar.

Key Facts & Figures

American sugar beet production spans 11 states, and sugar beet farmers are utilizing sustainability tactics to become more environmentally friendly.

Sugar beet producers are using herbicides with a **90% lower environmental impact** since the introduction of glyphosate tolerant seed in 2008



Many growers have adopted conservation tillage practices, which can result in up to **80% reduction in soil carbon emissions and improved soil health**



The industry has seen an **increase in sugar yield per acre by nearly 25%** over the past 9 years, maximizing the productivity per acre

Sugar beets producers **rely heavily on integrated pest management**. It reduces their reliance on crop protection products by allowing the plant to defend itself against pests and disease



Water use efficiency **has improved as much as 37%** in areas relying on irrigation for production



Trips across the field throughout the season have vastly reduced thereby **decreasing fuel consumption by up to nearly 50%**



More on Sustainable Sugarbeet Practices

Sugar production companies are constantly looking for ways to enhance sustainability practices and reduce their carbon footprint. Methods include improvements in utilizing energy, participation in numerous industry, trade, and community stakeholder groups to develop and implement best practices in regard to environmental performance, expanded and enhanced treatment process, and alternative production practices.²²

Thanks to adoption of genetic engineering, sugar beets are more sustainable than ever. GMO sugar beets mean farmers can take fewer passes through their field, reduce greenhouse gas emissions, reduce soil erosion, reduce soil compaction and enhance water conservation, all while using pesticides more precisely.²³



WAYS GENETICALLY ENGINEERED SUGAR BEET CROPS HELP THE ENVIRONMENT.²⁴

Fewer,
less impactful
herbicide
applications



Reduced
greenhouse
gas emissions
from soil
and fuel



Reduced
soil erosion



Reduced
soil
compaction



**And
enhanced**
water
conservation



Future Sustainability Goals

Western Sugar Cooperative is striving to reduce environmental impact and improve sustainability practices with these goals:

- **Reduce** impact of crop protection products
- **Promote** improved sugar yield per acre
- **Support** more widespread adoption of conservation tillage practices
- **Encourage** adoption of more efficient water irrigation systems

Furthermore, all U.S. beet sugar cooperatives provide funding to local research to enhance the performance and sustainability of sugar beets. Many of these funded projects are directed at sustainability, including improved nutrient management, optimization of irrigation, advanced disease and pest management, and mitigation of herbicide resistance development in weedy populations.

²² <https://www.crystalsugar.com/sugar-processing/environmental-commitment/>

²³ <http://www.sugarindustrybiotechcouncil.org/consumer-sugar-beet-information/sugar-beet-benefits>

²⁴ <https://sugaralliance.org/get-the-facts#1485836361313-71d13c7e-dc52>

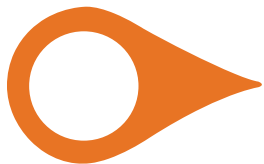
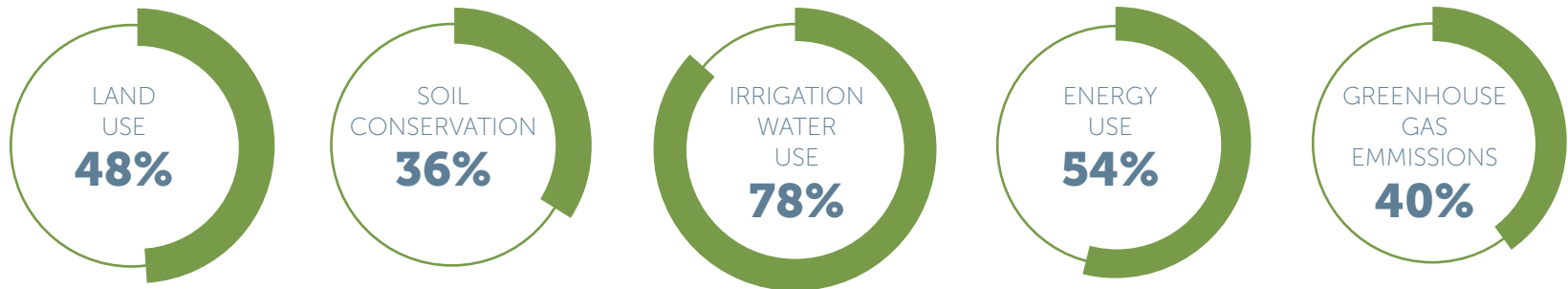


COTTON

U.S. cotton has a track record of continuous improvement with respect to water, crop protection, habitat and soil preservation. The transparency of the U.S. cotton system allows for constant monitoring and improvement. About 13,000 U.S. cotton growers comply with the stringent U.S. regulatory requirements and are committed to the principle of improving sustainable practices.²⁵

Key Facts & Figures

Over a 35 year period, to make one pound of cotton, the process improved by²⁵:



GMO cotton seeds and conservation tillage practices have reduced cotton's CO² emissions by an amount equivalent to removing more than 27,000 cars from the road-permanently.²⁷

²⁵ <https://fieldtomarket.org/national-indicators-report-2016/cotton/>

²⁶ <https://www.barnhardtcotton.net/sustainability/>

²⁷ <http://www.cottoncampus.org/cotton-environmentally-friendly-sustainability/>

More on Sustainable Cotton Practices

U.S. cotton growers examine a variety of metrics to gauge their sustainability, especially as it relates to economics. These include:

- Land Use Efficiency
- Soil Conversion
- Greenhouse Gas Emissions
- Soil Health

Cotton farmers are experimenting with weed suppression, reduced tillage, cover crops and rainfall capture practices to improve the longevity of their soil. Roughly 60% of the U.S. cotton crops rely on rainfall to meet all their water needs. Among the growers that do apply irrigated water, **56% use sprinklers, and 35% use furrow or basin systems.**²⁸

Conservation tillage helps U.S. cotton growers **reduce soil loss, increase water holding capacity** and **minimize runoff**. This practice has resulted in a **68% reduction in soil loss** over the past 30 years. On average, 13% of the land on cotton farms is natural habitat (non-cropped). In 2008, 53% of cotton growers said they left native habitats undisturbed; today 74% make that same claim.²⁹



In 2015, 92% OF COTTON GROWERS reported they utilize at least one smart farming technique, mentioned below:³⁰

46%

of growers use
GPS-enabled
soil samples

37%

of growers
employ soil
mapping

51%

of growers use
GPS-based swath
control (prevents
overlapping of
crop inputs)

60%

of growers use
real-time flow
control for precise
herbicide
application

²⁸ <http://cottontoday.cottoninc.com/wp-content/uploads/2016/08/Water-Fact-Sheet.pdf>

²⁹ <http://cottontoday.cottoninc.com/wp-content/uploads/2016/08/Land-Fact-Sheet1.pdf>

³⁰ <http://www.cottonleads.org/wp-content/uploads/NRS-for-web.pdf>



America's Perception of Agricultural Sustainability

On behalf of the American Farm Bureau Federation, Morning Consult conducted a poll in February, 2017 to almost 2,000 registered voters. Regardless of political affiliation or perceived definition, almost everyone supports sustainability.³¹

Key Findings from the poll include:

AGRICULTURE AND FARMING

78% have a favorable view of agriculture and farming



85% view agricultural sustainability as somewhat or very important



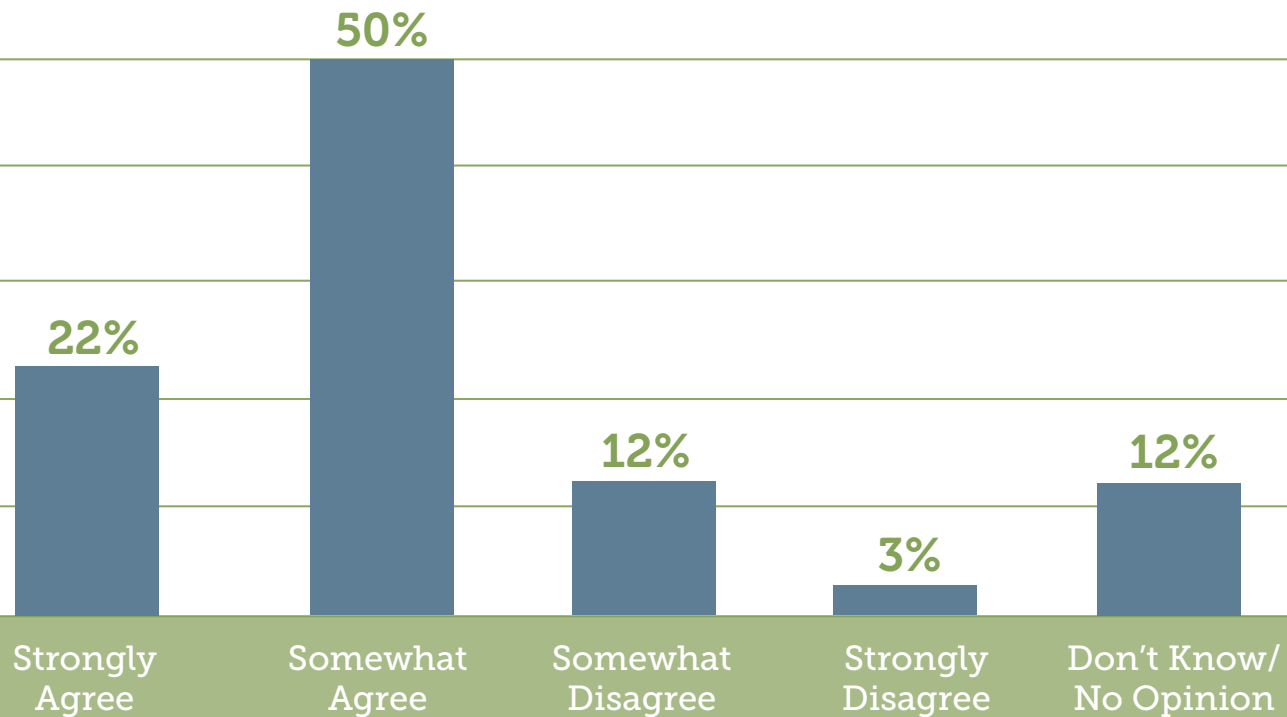
56% see agriculture and farming as more good than bad



65% rate the current agricultural sustainability efforts as excellent or good



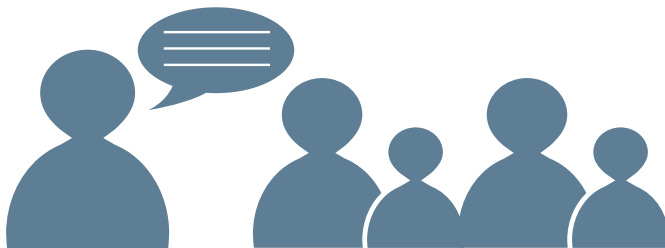
DO YOU AGREE OR DISAGREE WITH THE FOLLOWING STATEMENT:
MODERN AGRICULTURE IS SUSTAINABLE.



Sustainability Priorities in Farming and Ranching

Water, soil, air and habitat are the fundamental pillars farmers and ranchers focus on when it comes to sustainability. But, sustainable agriculture goes beyond just measuring these inputs. Farmers and ranchers **care about** these resources as they are the lifeblood to maintaining successful operations and preserving the land they, and their families, live on. Farmers and ranchers also have to be proficient with how they manage these key resources during droughts, heavy-rains, inconsistent crop outputs, and any other unforeseen circumstances. Agriculturalists in the U.S. are focused on properly managing their local ecosystem in a manner that sustains biodiversity in soil, water and overall habitat. This enables farmers and ranchers to be environmentally sustainable, but just as important, economically sustainable as well.

Consumers are increasingly aware of the importance of sustainability, conservation and land management. Our 2016 consumer perception survey shows the majority of consumers say they consider the sustainability of how food is grown and raised when making purchasing decisions.



Consumers listed the following as their top priorities in relation to sustainability in farming and ranching practices:

- Protecting the environment most impacted by farming practices — specifically water, soil, air and habitat — to keep the land healthy for future generations
- Doing more with less by responsibly managing and replenishing the finite resources used to grow our food and raise our animals
- Ensuring our food nourishes all people regardless of socioeconomic status by making it accessible, affordable and healthy
- Enhancing local communities by contributing to economic growth

Let's examine the ways agriculture gauges its environmental impact through case studies of how farmers and ranchers are practically applying sustainable production practices to water, soil, air quality and habitat.



WATER

Water is the most valuable resource because all living entities need it to grow and thrive. In the United States, approximately 39% of fresh water is used for crop irrigation.³² Water preservation is an essential component of sustainable farming and ranching. Additionally, water preservation is a top priority to consumers, according to USFRA's 2016 perception survey.³³

Over the past few decades, farmers and ranchers have continuously worked to find innovative solutions to improve their impact on water usage, including the adoption of irrigation technologies and water management practices. Examples of this

include the adoption of precision irrigation systems — such as high efficiency sprinklers and soil monitoring — and applying technology to measure and monitor water usage. Additionally, using buffer strips between crops and waterways help filter nutrients and prevent nitrogen from seeping into rivers and streams. **This not only ensures healthy soil and water, but allows farms' surrounding environments, such as waterways and watersheds to cycle through their natural ecosystems without threat of impact from crop or livestock influence.**



*Back in the 1990s we had a 10-inch rain fall that caused devastating erosion damage and impacted our water quality. Today, I look at the runoff and several waterways on our farm and continually see clean water. **Because of GMO crops allowing us to utilize no-till practices, we have really improved our ability to withstand a hard rain or even a medium rain.*** – Ken McCauley, Kansas corn and soybean farmer



AIR QUALITY

From clean burning tractor engines to wind power, modern agriculture is making significant effort to manage emissions and preserve air quality. A big part of maintaining healthy air quality is ensuring a healthy farm ecosystem, particularly with any sprays or tillage. New technological advancements — such as GPS — allow farmers to precisely apply the smallest and most effective amount

of pesticides, which benefits the overall air quality. What's more, from 1980 to 2008 **farmers and ranchers were able to reduce the amount of pesticides applied on farms by 18%.**³⁴ This reduction is equivalent to a total of 116 million less pounds of pesticides used, ensuring cleaner air quality overall.

³² <https://water.usgs.gov/edu/irmethods.html>

³³ <https://usfra.app.box.com/s/uk86zi1g8tbh1kpcol41xy9tryvzr7by>



SOIL

Soil health is a cornerstone of sustainability in agriculture. Healthy soil is the literal foundation of healthy crops and livestock. Farmers, ranchers and consumers all understand the importance of responsibly maintaining this resource. In fact, **56% of consumers agree** that farmers and ranchers are already utilizing new technologies and innovations to protect the environment; many of these innovations directly help to monitor and improve soil health for future generations.

Since soil is irreplaceable, farmers and ranchers treat it accordingly by implementing different approaches to successfully increase

soil organic matter, fertility and tilth. Farmers and ranchers use methods that are based on science, education, monitoring, and testing, that are grounded in an overarching dedication to sustainability. Examples of on-farm sustainability practices regarding soil health include: practicing conservation tillage, which leaves crop residue on fields to reduce soil erosion and runoff, allowing soil to stay healthy to use for generations and the ability to grow more crops on the same amount of land.



*On our farm we try to do soil sampling every year and apply only the necessary nutrients. We also utilize herbicides and insecticides only as needed and can evaluate what challenges may exist, **thanks to field mapping and precision technology**. This allows us to approach each field differently.* – Roberta Simpson-Dolbeare, Illinois corn, soybean and wheat farmer



HABITAT

Farmers and ranchers are deeply committed to preserving the land, habitat and ecosystems where wild plant and animal species live and thrive. Examples of on-farm practices include creating natural habitats for birds, pollinators, fish and wildlife, while protecting the environment through resource management and on-farm monitoring tools. An example of a flourishing initiative is The Conservation Reserve Program (CRP), a land conservation program administered by the Farm Service Agency

(FSA). In exchange for a yearly rental payment, farmers enrolled in the program agree to remove environmentally sensitive land from agricultural production and plant species that will improve environmental health and quality.

Contracts for land enrolled in CRP are 10-15 years in length. **The long-term goal of the program is to re-establish valuable land cover to help improve water quality, prevent soil erosion, and reduce loss of wildlife habitat.**

AGRICULTURE INDUSTRY'S COMMITMENT TO SUSTAINABILITY

American agriculture aligns and collaborates on many issues that impact food production. Sustainability may be the greatest example across the industry, from farm and commodity groups to seed companies, animal health, crop protection and fertilizer providers and companies that bring forward new innovations that aid agriculture in our effort to protect the environment. Notably, companies conducting seed genetic research and bringing advanced technologies to farmers have provided specific ways to optimize water use, increase yield, control pests, and improve other overall efficiencies in corn, soybeans, cotton and sugar beet production, among other crops.

WATER: Biotech and breeding advancements, such as drought resistant seeds, are helping farmers conserve and optimize water use. Advancements in drought resistant seed technology allow farmers to produce more stable crop yields in varying growing conditions, and give growers an extra option for crop rotation. Additionally, agricultural partners are working to optimize irrigation solutions that could increase water efficiency 25% by 2020.

SOIL: Our agricultural industry partners believe in working directly with farmers to help the advancement of soil health practices. Agronomists and other farm management advisors work with farmers to help them implement low- or no-till practices, plant winter cover crops and manage soil health through the precise application of fertilizers and other micronutrients such as phosphorous, potassium and lime. Also, our industry partners are working to create a set of universal guidelines that would teach farmers the crucial link between soil management practices and soil health.

HABITAT: Honey bees help produce one in three bites of our food, therefore, pollinator health and habitat are top of mind for our agricultural industry partners. Many of our partners are investing resources into the Honey Bee Health Coalition. Their donated resources contribute to continued research and understanding of hive health, pollinator habitats and bee health, among other things.



Farmer & Rancher Stories



Bill Gordon,

Minnesota corn and soybean farmer

For Bill, “sustainability” isn’t a word they use on a daily basis, it’s just how they do things. How to have the least impact on the land while

being the most environmentally friendly is wrapped into each decision they make before planting a crop.

In their tillage tools and practices, they have the right amount of residual matter to hold the soil in place to minimize erosion. In addition, they utilize buffer strips on all of their acres, including wildlife management areas. Their herbicide program is also focused on what has the least environmental impact and uses the least amount of products.

“When we talk about sustainability, it’s the whole picture. We’re automatically doing the best job we possibly can. We don’t change our mindset about how we are going to do things because someone is asking us to be more sustainable.”



Galen Lee,

Idaho sugar beets, asparagus, peppermint, dairy, and beef farmer

Galen Lee runs a diversified crop farm, raises beef cattle, and milks about 280 cows on his dairy. Galen

doesn’t use a plow, but instead uses a disc to work the ground. Not only does this help reduce erosion, but it also saves fuel. As a result of these conservation tillage practices, they have increased microbial activity in the soil.

Galen plants both GMO corn and sugar beets, which allows them to farm more sustainably. GMOs allow him to take fewer trips over the field and use fewer inputs. Biotechnology has helped them become more efficient, which is a significant factor because sugar prices in 2017 are the same as they were in 1980.

“As for sustainability, my family has been farming the same land for 100 years. And we’re going to continue to have this farm for generations to come. So my farming practices are based on a year after year progression, not just a year or two.”



Nancy Kavazanjian,

Wisconsin corn, soybean,
and wheat farmer

Nancy and her husband developed a motto 37 years ago on their farm, 'Our soil is our strength', which still

applies today. Improving organic matter by reducing tillage and using cover crops was just as important then as it is today.

In northern climates, using cover crops is more difficult. Nancy and her husband are trying to make them work when and wherever possible. They use a wide variety of plants such as tillage radishes to help break up the soil and hold the nitrogen in place. In addition, they have 17 acres of pollinator habitat, which to her, is very important for sustainability.

For energy conversation, they use a wind turbine which is connected to the grid, and it offsets 70 percent of the electric needs on their farm. They also recently installed solar panels, and purchased new, energy efficient machinery.

"Sustainability means I'm efficient and doing more with less resources. I'm growing healthy crops, and that means we have to have healthy soils. That's why our motto - our soil is our strength - has been so key to everything we do."



Tim Nilsen,

California turkey farmer

On Tim's Nilsen's farm, they have three operations, all of which harness the sun's energy with photovoltaic technology (solar energy converted into electric

power). This helps reduce their carbon footprint by offsetting peak demand of electrical usage during the hot summer months, when energy is the most valuable. They have increased efficiency with these systems as well as decreased power consumption.

In addition, a state-of-the-art ventilation system inside of the turkey barns monitors temperature and humidity to maximize efficiency of heating and cooling. The system uses evaporative cooling techniques thereby reducing the workload and management of employees by continuously adjusting ventilation levels. This system also reduces emissions and protects air quality, preventing greenhouse gases from being released into the atmosphere.

Along with maximizing our efficiency as a grower, we are constantly looking for ways to reduce our impact to our surroundings. Being good stewards of the environment pays off - we protect our farmland, and we are continuously blessed with a clean environment to grow healthy turkeys for consumers to enjoy."



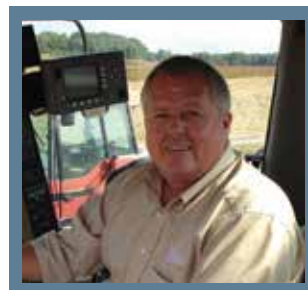
Deb Gangwish,

Nebraska soybean, seed corn, oats, and cattle farmer

On Deb's farm, sustainability is top of mind, and she employs various practices including no till on her farm, to preserve and enhance the soil, water and air. She is able to monitor water usage as her farm is 100 percent irrigated. In addition, they have a full time agronomist on staff to help them continue down the sustainability path.

Deb and her husband have farmed pre-GMO and post-GMO. They found that growing GMO crops has allowed them to significantly reduce the amount of crop protection applications, herbicides and greenhouse gas emissions - as well as reduce emissions. GMOs are a key component of their sustainability program, because they give them the tools to do more with less. In the end, to achieve sustainability, she believes farmers must harness the most modern technology, including biotechnology.

"The first step to sustainability and conservation is appreciation, and I can think of no other group of people who appreciate this planet more than farmers."



Chip Bowling,

Maryland corn, soybean and wheat farmer

Chip's farm is 100 percent no till, a production practice that allows him to grow crops without disturbing the soil. It thereby conserves more moisture, reduces soil erosion and retains nutrients and organic matter. Chip's farm, as well as neighboring farms, are adopting new technologies and traits as a way of conservation to enhance their sustainability.

Chip also has a nutrient management program that incorporates cover crops to help capture nutrients in the winter, which leads to a decrease in fertilizer and pesticide use. In addition, GMO crops minimize tilling of the soil, as well as pesticide use, while increasing yields and the conservation of water.

"For me, sustainability means that I'll be here next year. My kids will be there in 10 years, and their kids will be there in 50 years."



Lauren Schwab,

Ohio pig farmer

On Lauren's pig farm, they use 80% less energy per pig raised today than in the 1970s. Things like improved nutrition, breeding practices and changes in animal

housing have driven down overall energy use. For example, fresh air is ventilated in by fans and drop curtains are lowered in the summertime to use the natural breeze.

The pig waste serves as a natural fertilizer for their neighboring corn and soybean crops. Pig manure contains many micronutrients (zinc, sulfur, magnesium, manganese, calcium and iron), which are essential to soil and crop growth and health. In addition, her farm does soil testing to ensure they are properly managing and implementing the nutrients. For her, sustainability is constantly working to create more with fewer resources, without compromising the state of the land and the health of the people and animals.

"We use 80 percent less energy to raise a pig than we did in the 1970s. We're able to use less land by keeping our animals indoors, we're able to use less water through automatic feeding, there's automatic curtains that go up and down and fans and ventilation systems, which protect the environment that we all live in."



Emily Buck,

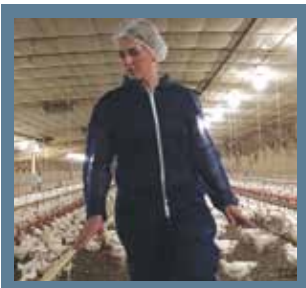
Ohio crop and sheep farmer

Emily uses several sustainability practices on the farm; her most measurable method is soil testing. They conduct soil testing down to the acre, that helps them determine

what nutrients they have and what nutrients are missing. Every input they use whether it's herbicides, insecticides or fertilizer, will only be applied in the exact amount needed..

Emily's farmland sits on the Lake Erie and Mississippi River watersheds so water management is of great concern. They have been working with Ohio State to test their water, waterways, and water runoff. They use cover crops and buffer strips that catch runoff before it leaves the field, while also providing a wildlife habitat surrounding the fields.

"One of the biggest opportunities we have is to help consumers better understand modern food production. If people understand how food can be raised using science to allow for more sustainable practices, they might be more welcoming to the variety of food on the market and not scared by marketing tactics."



Lauren Arbogast,

Virginia poultry, cattle, and crop farmer

On Lauren's farm, rather than drinking from the natural water sources, the cattle drink from automatic water spouts connected

to a well in the field. Not only does this prevent the cattle from eroding the bank of the water source with their travel, but it eliminates excess nutrients in the water. In addition, Lauren and her family, in partnership with the NRCS (Natural Resource Conservation Service - USDA), plant buffer zones to reintroduce native plant and tree species around the water. This also helps prevent erosion and increases the habitat for wildlife in the area.

All manure and litter from their chickens and cows are applied as fertilizer on their crops, at the right time and in the right places. Keeping the manure in a storage facility until it's used decreases the chances of it seeping into groundwater or local water sources.

"Sustainability can have many different definitions and implications for farmers and ranchers, depending on the location of their farm, what they produce, and the surrounding environment. For us on our farm, with chickens, cattle, and crops, we work as a family and in partnership with other organizations to do what is best for the land, water, animals, and humans. As farmers, this is a core metric for us."



Katie Roth,

Wisconsin dairy farmer

On Katie's dairy farm, they believe in reusing resources to enhance sustainability. For example, they use a plate cooler to cool the milk and then provide the water for the

cows to drink. In addition, the milk warms the water so when it travels to the water heater, less energy is needed to heat water in the parlor. Katie also recycles the plastic from their silage bags, bunker covers, and bales to be made into garbage bags.

To reduce the amount of commercial fertilizer needed, they haul the cow manure to apply on their crop ground. They also grow all of their own feedstuffs on the farm.

"It's important to care for soil for future generations, and we want to leave the precious topsoil better than we found it."



The Future of Agriculture

Sustainable farming practices of the future will continue to be rooted in science, technology and innovation. Agriculture's focus on continuous improvement will build on some of the practices being used today, while others, still in their infancy, will mature. Regardless of the practice or technology employed, farmers and ranchers always look for ways to improve their practices based on sound science and protecting the water, soil, air and habitat in and around their farming and ranching operations.

A few examples of technology we can look forward to in the near future, include:

- **Big Data: Collection, Analysis and Practical Application** – Farmers have always relied on data. Today and into the future, farmers will continue to digitize critical data that will help them improve production practices, ultimately driving sustainability and yield. Advances in precision agriculture allows farmers to review and analyze data that is often collected through sensors on and around their farming operations. This data can provide insights for planting strategies to monitoring of animal health. Additionally, this information is often available via smart phones and tablets, allowing farmers/ranchers remote access to data used to make critical business decisions.
- **Autonomous Vehicles** – According to analysts at Goldman Sachs, farm technologies have the potential to become a \$240 billion market opportunity for ag suppliers.³⁵ These analysts predict that smaller driverless tractors account for \$45 billion of the larger autonomous vehicle market in agriculture. While most of today's conversation about "driverless" vehicles is focused on the consumer market, the applications in agriculture are numerous and could include:
 - Replacing tractors with autonomous sprayers in row crops, orchards and vineyards
 - Robotic equipment to replace specific tasks on the farm
 - Precision agriculture techniques for the application of fertilizers, for planting, spraying and irrigation

- **Unmanned Aerial Vehicles (UAVs) to Drive Precision Agriculture** – As UAVs—also known as drones—become more common in the consumer world, the agriculture industry also is identifying new ways to incorporate UAVs into day-to-day production practices. The simplest application being used today is surveying land by air. As this technology evolves, the future may include attaching sensors to drones to collect and combine data from soil, to help with future conservation of water, and precise application of crop inputs.
- **Gene Editing: CRISPR** – The future of biotechnology includes CRISPR, a gene editing technology that will have many applications in science—including agriculture. This gene editing technique has the promise of creating plants that are more resistant to the elements—including drought and pests, could improve yield, and ultimately drive a more sustainable agriculture production.



Jeremy Brown, a West Texas cotton and crop farmer, uses variable rate fertilization to improve his efficiency in growing his crops. He controls the irrigation on his farm through an app on his smart phone. Brown also conducts grid sampling in his fields to measure the soil nutrients and electroconductivity. Based on the measurements, he can then apply fertilizer more precisely, giving the soil exactly what it needs to grow crops.





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