



United States Department of Agriculture

# USDA, INVESTMENT IN AG RESEARCH FEEDS FAMILIES AND FUELS THE FUTURE

Every dollar invested in agricultural research generates \$20 for the broader U.S. economy.

1

**INCREASE AGRICULTURAL PRODUCTIVITY**

2

**MEET CLIMATE CHALLENGES & STRENGTHEN THE BIOECONOMY**

3

**PROTECT NATURAL RESOURCES FOR FUTURE GENERATIONS**

4

**PROMOTE HEALTHY FAMILIES**

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**MAKE SURE OUR FOOD IS SAFE TO EAT**

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**STRENGTHEN RURAL COMMUNITIES & THE RURAL-URBAN INTERFACE**

6

**INSPIRE FUTURE AG SCIENTISTS**



## BREAKTHROUGHS IN RESEARCH, POLICY, AND PRACTICE

### 1 INCREASE AGRICULTURAL PRODUCTIVITY

With climate variability, **extreme weather conditions can make it difficult** for farmers to meet consumer food demands with sufficient quantities of low-cost products. To address these challenges, USDA-funded researchers studying **wheat and barley**<sup>1</sup> from 2005-2017 have developed **new varieties adapted to changing environments**. These varieties represent approximately **15 percent of the wheat** harvested and **4 percent of the barley** harvested in the United States, with respective production values of **\$1.8 billion and \$61 million**.

The rapidly increasing population that is projected to reach nearly 10 billion by the year 2050 is more than doubling global food demands. To meet these demands, breeders are using genomics to accelerate the development of high-performing, resilient crops and livestock.



USDA-funded researchers<sup>2</sup> are **expanding the genomic toolkit in dairy cattle breeding** by identifying genetic markers for milk yield and health. These tools are already accelerating the rate of **increase in milk production by 50-100%**, with even more rapid gains in traditionally hard-to-improve traits such as fertility and lifespan.

USDA researchers and international partners<sup>3</sup> identified molecular markers for cooking time in common bean. Breeders used these tools to develop a **new bean variety that cooks in one to two hours less than the original variety**. As a result, **more protein** is retained in the beans, **less firewood** is required to cook the beans, and **less carbon** is emitted during the cooking process.

### 2 MEET CLIMATE CHALLENGES AND STRENGTHEN THE BIOECONOMY

Increasingly variable weather and climate conditions make it increasingly difficult for farmers and foresters reliably produce food and fuel. USDA's **10 regional climate hubs** partner and collaborate with farmers, ranchers, and other government agencies to:

- **Gather climate projections** and identify resource vulnerabilities
- **Deliver information and technologies** to natural resource and agricultural managers
- **Inform agricultural management decisions** and reduce risk

How can data drive decision-making on the farm? Example: Satellite data can drive decision making for farmers responding to drought.

Farmers need weather data—like drought warnings—as early as possible to make critical decisions that may make or break their crop yields and food animal production. Researchers at the USDA Hydrology and Remote Sensing Lab are using **satellite data to inform farmers about drought at early stages**. Satellites transmit time-sensitive imagery and other data to show drought impacts on agricultural lands.

What can be accomplished with a billion dry tons of sustainable biomass? The USDA's Billion Ton Bioeconomy envisions a future with increased economic activity based on domestic, renewable resources. As a part of this vision, scientists have long sought to transform cellulose, the main component of wood and the most abundant material in nature, into sustainable biofuel. A USDA-funded private-public partnership<sup>4</sup> recently accomplished this feat, **fueling a commercial flight powered in part by 1,080 gallons of renewable fuel** made from sticks and twigs salvaged after commercial timber harvest.

### 3 PROTECT OUR NATURAL RESOURCES FOR FUTURE GENERATIONS

The existence and health of pollinator communities is essential for many crops. **Farms generate \$29 billion from insect-pollinated crops**. The productivity of these crops are threatened, however, by

historically high, unexpected losses of honey bees. USDA-funded research has shown that **diverse habitats promote pollinator health**. Armed with this knowledge, farmers and beekeepers can **adjust landscape composition to ensure healthy pollinators and produce fruitful crops**.

### 4 PROMOTE HEALTHY FAMILIES

Food consumption surveys conducted by USDA and U.S. Department of Health and Human Services reveal a **dramatic shift away from home-prepared foods** to foods prepared at sit-down restaurants, fast-food establishments, and other locations. Foods prepared outside of the home are typically less nutritious than home-prepared food. Following the guidance of social science and behavioral research, USDA is encouraging parents to **make healthy eating a family affair** by controlling their children's eating habits and **involving their children in meal planning, vegetable selection, and food preparation**.

### 5 MAKE SURE OUR FOOD IS SAFE TO EAT

Noroviruses—one of the most common causes of stomach flu—annually cause approximately **5 million cases of foodborne illness** costing

the U.S. more than **\$2 billion per year**. USDA-funded scientists<sup>5</sup> have **successfully cultivated human noroviruses outside of the human body**, which previously had not been possible. This breakthrough will enable scientists to better understand the norovirus, which will ultimately **lead to new viral control strategies, mitigate food contamination, and reduce associated healthcare costs**.

### 6 INSPIRE TOMORROW'S AGRICULTURAL SCIENTISTS

Over the next five years, food, agricultural, natural resources, and environmental sciences are projected to generate nearly 58,000 new jobs. However, only 35,000 students will graduate from U.S. colleges of agriculture—a 40% shortfall in qualified workers<sup>6</sup>. **USDA therefore invests in developing the next generation of scientists** in these fields and is committed to building a diverse workforce that represents broader U.S. demographics. For example, the Hispanic Serving Institutions (HSI) Education Grant program strengthens the educational capacities of HSIs and offers students experiential learning opportunities. Through this program, **NIFA also partners with ARS to offer 125 summer internships every year** that enable students to work under the supervision of an ARS mentor on a groundbreaking project.

### 7 STRENGTHEN RURAL COMMUNITIES AND THE RURAL-URBAN INTERFACE

Strong local and regional food systems **increase access to fresh foods in both rural and urban areas, reducing hunger in at-risk communities**. These food systems also create jobs throughout rural America, supporting small and mid-sized farmers and revitalizing rural economies. In 2014, industry estimates indicated that **160,000 farms are involved in food sales and that the value of the local foods market was nearly \$12 billion**. In 2016, NASS launched the Local Food Marketing Practices Survey<sup>8</sup>, the first-ever survey to provide official benchmark data on the U.S. local food sector. These data will be used to **identify future needs and inform decisions and programs that support local and regional food systems**.

HIGHLIGHTED ACCOMPLISHMENTS IN SUPPORT OF THE REE ACTION PLAN  
FOR MORE GO TO WWW.REE.USDA.GOV

**REFERENCES AND FOOTNOTES:** <sup>1</sup>Triticeae Coordinated Agricultural Project. [www.triticeaecap.org](http://www.triticeaecap.org) | <sup>2</sup>Functional Annotation of Animal Genomes. [www.faang.org](http://www.faang.org) | <sup>3</sup>Bean Coordinated Agricultural Project. [www.beancap.org](http://www.beancap.org) | <sup>4</sup>Northwest Advanced Renewables Alliance. [Nararenewables.org](http://Nararenewables.org). | <sup>5</sup>Norovirus Collaborative for Outreach, Research, and Education. [Norocore.ncsu.edu](http://Norocore.ncsu.edu) | <sup>6</sup>Employment Opportunities for College Graduates in Food, Agriculture, Renewable Natural Resources, and the Environment—United States, 2015-2020. [www.purdue.edu/usda/employment](http://www.purdue.edu/usda/employment). | <sup>7</sup>Local Food Marketing Practices Survey. [www.agcensus.usda.gov](http://www.agcensus.usda.gov) | <sup>8</sup>USDA's Research, Education, and Economics (REE) Mission area is comprised of Agricultural Research Service (ARS), Economic Research Service (ERS), National Agricultural Statistics Service (NASS), National Institute of Food and Agriculture (NIFA). REE coordinates with Forest Service Research and Development (FS R&D). | Infographic editor: Stephanie Pearl, USDA/NIFA | Infographic designer: Stephanie Engle, USDA/NIFA | January 2017