



**Testimony of Steven Rosenzweig, PhD, Senior Agricultural Scientist, General Mills  
Submitted to the United States Senate Committee on Agriculture, Nutrition and Forestry  
Hearing on “Agricultural Research and Securing the United States Food Supply”  
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Chairman Roberts, Ranking Member Stabenow and Distinguished Members of the Committee, thank you for the invitation to speak about the importance of agricultural research in securing our nation’s food supply. As one of the world’s largest food companies, General Mills celebrates this committee’s bipartisan legacy of supporting public food and agriculture research. Your accomplishments in the last Farm Bill’s research title were remarkable and should be applauded. Chairman Roberts, I’d like to especially thank you for your distinguished leadership on agriculture, nutrition and national security in Congress over the last 40 years.

I am Steven Rosenzweig, a Senior Agricultural Scientist at General Mills. While I was a PhD student studying soil science, I never imagined myself working for a global food company, let alone testifying to this committee on its behalf. The fact that positions like mine exist reflects the importance of agricultural research to every level of the food system from farmers to consumers.

General Mills is a major packaged-food manufacturer engaged for over 150 years in the development and production of food products including ready-to-eat cereals, yogurts, soups, snack bars, refrigerated dough, pet foods and numerous other products. Despite the unprecedented challenges posed by the COVID-19 pandemic this year, we continue making food the world loves and needs. This perseverance is a testament to the resilience of the farmers, suppliers, our front-line employees, and everyone else required to bring food from the farm to the table. But there are challenges facing our agricultural systems that threaten our ability to continue making food for another 150 years.

**Threats to Agricultural Resilience**

Agricultural production is increasingly vulnerable to disruption, which affects the price, quality, and availability of food for people in the US and around the world. Climate change threatens agricultural production both through sudden shocks like catastrophic weather, and gradually escalating pressures like shifting temperature and precipitation patterns. These risks are compounded by the continued degradation of natural resources. Over a quarter of American cropland is losing soil to erosion at rates above the tolerable threshold set by the National Resources Conservation Service (NRCS) of the U.S. Department of Agriculture (USDA), with an average of 1.7 billion tons of [soil lost](#) from American croplands each year. Agriculture is the primary driver of biodiversity loss, and we are losing biodiversity across North America, notably [birds](#) and [pollinators](#), at unprecedented rates, constituting [billions of dollars](#) annually in lost crop production and billions more in economic losses [beyond the food system](#). Agriculture uses 80% of the water in the US, and it is being used faster than it can be replenished for critical water sources like the Ogallala aquifer beneath the Great Plains. Climate change will further widen the gap between water demand and supply. Furthermore, farmers are under mounting economic pressures, evidenced by increasing levels of debt, [bankruptcy](#), and [suicide](#) despite historic levels of government support.

Consumers care about where their food comes from. American agriculture has seen historic gains in productivity, but productivity and efficiency do not increase resilience, especially if these gains undermine the integrity of our agricultural and natural ecosystems. The challenge for American



agriculture today is to be productive while rebuilding our natural resources, leveraging the natural resilience of healthy ecosystems to fortify farmers and ranchers in the face of climate change. Restoring the health and function of our agricultural ecosystems and restoring farmers' and ranchers' economic vitality is the critical work to be done now to ensure resilient food systems into the future as consumer demands for sustainably sourced food grows

At General Mills, we are committed to treating the world with care, not just today but for generations to come. The health of our business depends on the health of the planet and the wellbeing of farmers who are the foundation of entire food systems. That is why we are on a mission to ensure thriving farmers and communities, and regenerate planetary health. It is with this mission and the recognition of the scale and urgency of the issues at hand that we have sought to lead the food industry in research and action for the regeneration of our agricultural systems. But, we can't do it alone. We need your continued support and leadership.

### **Regenerative Agriculture**

As a growing number of farmers and ranchers are demonstrating, focusing their innovation on restoring the soil and biodiversity of the farm ecosystem creates positive, cascading impacts on farm businesses, farm communities, and ultimately entire food systems. Regenerative agriculture is a farmer-led movement containing a diversity of ideas and beliefs, but at its core it is a holistic approach to farming and ranching that integrates multiple principles of agricultural management, similar to the principles of soil health codified by the NRCS, for improving ecosystem health and resilience: 1) Understand the unique context of the farm or ranch, 2) Minimize chronic disturbances to the soil and biological community, 3) Maximize diversity of plants and animals, 4) Keep the soil covered, 5) Keep a living root in the ground as long as possible throughout the year, and 6) Integrate livestock on cropland. When implemented together, these principles work to restore and enhance key ecosystem processes like water infiltration, nutrient cycling, and naturally regulated pest cycles. Regenerative farmers leverage these natural processes to reduce reliance on external inputs, increase profitability, and provide a range of ecosystem services like mitigating climate change, supporting biodiversity, and providing cleaner water. An [analysis](#) we conducted along with Ecotone Analytics suggests that for every \$1 invested in regenerative agriculture, an additional \$5 in social, environmental, and economic value is generated for farmers and landowners, taxpayers, local community members, municipal water users, and society as a whole. This growing movement among farmers and ranchers focuses innovation on integrating the regenerative principles to create a win-win for agriculture and the environment. At General Mills, we believe in the regenerative capacity of agricultural innovation, which is why we've committed to advancing regenerative agriculture on one million acres by 2030.

General Mills employs an outcome-based approach to regenerative agriculture. As opposed to a practice-based checklist or certification of specific farming activities, we consider a farm or ranch regenerative if it improves soil health, biodiversity, water, and farm economic resilience. Our focus on a holistic suite of outcomes reflects the multitude of benefits that regenerative agriculture can provide. Regenerative agriculture can address issues of both environmental and economic resilience. For example, analyzing data from the USDA Agricultural Research Service and other long-term cropping system experiments across North America, researchers found that crop rotation diversification alone increased yields over time and under all growing conditions, including [mitigating yield losses](#) by up to 90% in drought years. In a [national survey](#) of cover crop users, farmers on average report yield increases up to 5% with cover crops, and money saved on fertilizers and herbicides. And lastly, a survey conducted



by South Dakota State University found that relative to conventional farmers, farmers who use soil health practices are [more optimistic about the future](#) of their operation, more satisfied farming, less stressed, and even indicate that they have more fun.

We also consider regenerative agriculture to be the greatest opportunity for meeting our climate commitment. In 2015, General Mills became the first company across any sector to publish a goal approved by the Science Based Targets initiative to reduce absolute greenhouse gas (GHG) emissions across our full value chain. There are now over 1000 companies with such a commitment. For General Mills and many other food companies, the areas of greatest environmental impact in our value chain occur outside of our direct operations. Agriculture makes up over half of the GHG emissions in our value chain, meaning we must help farmers address agricultural emissions in order to meet our commitment to reduce our GHG footprint by [30% by 2030](#). Regenerative agriculture can pull carbon dioxide out of the atmosphere and sequester it in soil as organic matter, where it nourishes a network of life. Increasing soil organic matter also rebuilds the natural reservoir of nutrients in the soil, helping farmers reduce their reliance on GHG-intensive fertilizers. Regenerative agriculture empowers farmers and ranchers to play an important role in the fight against climate change, and thus it can and should be a part of an economy-wide strategy for addressing climate change.

The food and agricultural industries have a critical stake in the health of our agricultural ecosystems, and thus have a role to play in advancing the farmer-led regenerative agriculture movement. At General Mills, we have begun our journey to meaningfully engage this movement and invest in its potential to regenerate ecosystems and livelihoods. We have also made industry-leading investments in research to advance the science of regenerative agriculture and improve our understanding of its potential impact to the environment and economy. While we continue to invest our company's resources, we encourage this committee to continue to invest federal resources into public-private research partnerships in the food and agriculture sector to accelerate research efforts to help farmers and ranchers find the best solutions to meet the challenge.

### **Strategies to Accelerate Adoption of Regenerative Agriculture**

Over the last two years we have worked to pilot a variety of strategies for accelerating adoption of regenerative agriculture in key sourcing regions. These pilots build on several years of [award-winning](#) partnership and investment to drive progress toward our commitment to sustainably source our top 10 priority ingredients by 2020, defined for US grains and dairy as driving towards continuous improvement against industry-defined efficiency metrics. While these efficiency gains have been an important step, we now look to build on this work to enable farmers to go beyond sustainability to regenerate their agricultural ecosystems and businesses. Across every pilot there is a variety of farmer experience levels and production types – including both organic and conventional farmers, grain and mixed grain/livestock farms, and small and large operations. Our pilot strategies include a mix of different resources and incentives for farmers, including education, coaching, cost-share, payments for ecosystem services, establishing markets for alternative crops including perennials, and more. We are leveraging applied social science research to identify the most effective and scalable strategies for promoting sustained adoption of regenerative agriculture.

In 2019, we formed a partnership with the Kansas Department of Health and Environment (KDHE) and the Cheney Lake Watershed to advance regenerative agriculture in the production region surrounding the [Cheney Reservoir in central Kansas](#), the primary source of drinking water for 500,000 residents in



the Wichita area. This pilot strategy includes free educational workshops hosted by the [Soil Health Academy](#), and one-on-one coaching from [Understanding Ag](#), to help farmers develop and implement their own regenerative management plans over three years. Through field days, discussion groups, and social media groups, farmers are leveraging a peer learning network to accelerate learnings about successful practices. This pilot model seeks to supplement existing technical assistance resources from NRCS and other local conservation organizations to help build farmers' understanding of their ecosystem and its connection to the financial viability of their operation. This enables an understanding of why, regardless of any cost-share or external incentive, regeneration of their ecosystem is essential. We are working to expand this program into north-central Oklahoma, where there is currently only one conservation service provider for every 208 farmers. We are partnering with the Oklahoma Conservation Commission to hire a full-time soil health specialist who will collaborate with NRCS and Conservation District staff to lead regenerative agricultural education and technical assistance in the region.

We are also piloting a similar one-on-one coaching model with 45 farmers across a key oat growing region in [North Dakota and Canada](#), and with four large dairies and two dairy co-ops in [Michigan](#). The western lower peninsula of Michigan is a key dairy sourcing region to support the Yoplait yogurt brand, and we are working to understand what changes large dairies can make to integrate the regenerative agriculture principles and realize greater profitability. The dairy industry has been particularly hard hit in recent years, but we believe regenerative agriculture can build the resilience of dairy farmers to weather these pressures. Along with partnering with the co-ops and farmers to provide individualized coaching support from Understanding Ag, we have developed partnerships with the Institute of Water Research at Michigan State University to study the impacts of regenerative dairy practices on water quality, with Cornell University to model a holistic suite of outcomes across the dairies, and provided \$100,000 in funding to University of Wisconsin's Dairy Brain program to advance next generation data analytics for holistic dairy management. Building on this pilot in Michigan, we are commencing a partnership with the National Fish and Wildlife Foundation to integrate regenerative agriculture into the Sustain our Great Lakes program, a competitive grants program focused on benefitting fish, wildlife, habitat, and water quality in the Great Lakes basin. This new partnership will direct \$750,000 annually to expand technical assistance capabilities and increase enrollment in Farm Bill practices in complement to advancing regenerative agricultural principles across the Great Lakes region, with over half of the funds directed to the western lower peninsula of Michigan.

In partnership with Cargill and the recently formed MBOLD coalition, Minnesota's globally leading cluster of businesses, researchers, and food and agriculture producers, General Mills is supporting the Wilkin, Traverse, and Richland County Soil and Water Conservation Districts to promote soil health practices in the Red River Valley of Minnesota and North Dakota. With a planned \$1 million cash contribution from General Mills, this project will fund technical assistance and cost-share for several dozen farmers for five years, with the goal of establishing a network of soil health demonstration farms in one of the most intensively tilled regions of the country. Project funds will also enable the University of Minnesota and other research partners to study the soil health, water quality, economic, and social impacts of the changes in management.

In addition to these efforts we are working to support state-level coalitions of public and private organizations to enable the spread of the regenerative agricultural movement through enhanced coordination and alignment. In 2019 we helped support the creation of the Minnesota Soil Health



Coalition, and this year along with KDHE, No-till on the Plains, and the Kansas Grazing Lands Coalition we helped form the Kansas Soil Health Alliance.

By piloting and sharing learnings from these approaches and a range of other strategies, we hope to help the food and agriculture industries identify partnerships and investments that are impactful and scalable solutions for accelerating adoption of regenerative agriculture.

### **Advancing Agricultural Research and Ecosystem Service Markets**

Chairman Roberts and Ranking Member Stabenow championed the creation of Foundation for Food & Agriculture Research (FFAR) in the 2014 Farm Bill. Consistent with their vision, FFAR builds public-private partnerships to fund pioneering research addressing urgent challenges in food and agriculture. FFAR is attractive because it boosts private-sector investment with public support and accelerates research efforts to help us realize our sustainability goals. Several of FFAR's flagship programs have been launched in partnership with General Mills.

One example of this work is the Ecosystem Services Market Research Consortium (ESMRC), the research arm of the Ecosystem Services Market Consortium (ESMC), of which General Mills is a founding member. General Mills, together with KDHE and ESMC, is conducting one of the first pilots of this market alongside our regenerative agriculture pilot in Kansas, wherein farmers will be paid for GHG reductions and water quality improvements. Together with ESMRC and research partners at Colorado State University, Yale University, Applied Ecological Services, and the Soil Health Institute, we are conducting the research necessary to create a scaled, efficient, cost-effective ecosystem service marketplace that benefits farmers and ranchers. We believe that farmers and ranchers who are working to restore soil, biodiversity, water, and other natural resources should be paid for providing these services to society. Compensating farmers for their stewardship through an ecosystem services market improves both environmental outcomes and farmer profitability, and such a market may also provide a critical incentive for more farmers to adopt regenerative agriculture. As a member of ESMRC's working group on Racial Justice, we are working to ensure ESMC can serve as a tool of economic empowerment for all farmers, particularly for those that are Black, Indigenous, and people of color who have been historically underserved by federal programs and opportunities for economic advancement.

In addition to providing added value for farmers, ecosystem service markets provide companies a process to trace and verify impact on the environment and local communities. Currently, there is little standardization or guidance for how food companies should account and report GHG reductions in their agricultural value chains, but ESMC has provided a platform to help the industry begin to align. To strengthen the ESMC and further the scalability and standardization of ecosystem service markets, General Mills supports bipartisan legislation introduced by Senators Stabenow, Whitehouse, Braun and Graham. The Growing Climate Solutions Act would establish a *Greenhouse Gas Technical Assistance Provider and Third-Party Verifier Certification Program* through which USDA would provide endorsement of third-party verifiers and technical service providers that help private landowners generate carbon credits through a variety of agriculture and forestry related practices. As the demand for carbon markets grows it is imperative that we have qualified technical advisors helping farmers develop and implement the most beneficial practices for their land.

Given General Mills' outcome-based definition of regenerative agriculture, we seek to quantify the environmental and economic impact as farmers implement these systems. Most agricultural research to



date has focused on understanding the impacts of isolated conservation practices, assessing the difference between, say, till vs. no-till, or cover crops vs. no cover crops. But regenerative farmers are often implementing multiple practices at once, with additive or even synergistic effects for greater impact. Additionally, most research today focuses on assessing only a narrow set of performance metrics. For example, while there are many studies that examine the effects of conservation practices on yield, soil health, profitability, or biodiversity, it is rare to find studies that assess all or some of these different outcomes together. We need more long-term, systems-level agricultural research that focuses on a holistic suite of outcomes to help us better understand the range of impacts that occur when multiple regenerative principles are implemented together. To contribute to this understanding, we are partnering with ecological research firms, nonprofits, government agencies, and universities to track the changes in soil health and carbon sequestration, insect and bird biodiversity, water quality, and economic impacts as farmers in our pilots implement regenerative systems. We are also investing in the development of satellite imagery, sensors, and modelling to track adoption of regenerative agriculture and monitor a holistic suite of outcomes at a landscape scale.

General Mills has made many other notable contributions to advance agricultural research including:

- Support of the development of open source technology through OpenTEAM, which is a FFAR initiative to develop a farmer-driven, interoperable network of tools that provide farmers around the world with the best possible knowledge to improve soil health.
- Provision of matching funds to FFAR's \$9.4 million grant to the Soil Health Institute, The Nature Conservancy, and the Soil Health Partnership to improve soil health and support thriving farms. This is currently the largest soil health research program in the US.
- Contribution of over \$2.5 million to the University of Minnesota, The Land Institute, and value chain partners to support the development and commercialization of the deep-rooted perennial grain Kernza.
- Expansion of the Soil Health Partnership into wheat production systems in the Great Plains states through a \$735,000 grant to the [National Wheat Foundation](#).
- Partnerships with USDA ARS and public Universities like North Dakota State University, South Dakota State University, and the University of Minnesota to improve disease resistance in oat lines, enabling reduced fungicide use and organic oat production.
- Partnership with the Savory Institute to launch the Land to Market network and associated Ecological Outcome Verification, which is the first outcomes-based consumer facing label that promotes regenerative ranchers who monitor ecological outcomes.
- As one of the largest oat buyers in North America, we worked with USDA ARS to develop the 'Oats Grand Challenge,' an ARS internal program which enables \$5 million in new funding to minor crops.
- Supporting organic research through partnerships with the Organic Trade Association, the Organic Center and the Organic Farming Research Foundation.

## Conclusion

Thank you, Chairman Roberts, Ranking Member Stabenow, and Members of the Committee for your strong legacy of support for public agriculture research and for establishing FFAR's public private partnership model. Despite the many challenges facing our food and agricultural systems today, there are many reasons to be optimistic about the future. Farmers and ranchers, with the support of researchers and conservation professionals, are increasingly focusing their innovation on regenerating the



agricultural ecosystem, reversing the degradation of natural resources, and generating positive impacts for the environment and farm business. And more than ever, the private sector is looking for ways to contribute to the advancement of these regenerative agricultural systems. With emerging opportunities like ecosystem service markets and public-private partnerships for research and innovation through the FFAR model, the food and agriculture industries have immense opportunities to invest in securing the resilience of the American food supply, but with farmers struggling, we are far from the finish line. We encourage this committee to continue to invest federal resources into public-private research partnerships in the food and agriculture sector to accelerate research efforts to help farmers and ranchers meet the challenge. If research in regenerative practices from companies like General Mills is matched by increased public investment by our government, utilizing organizations like FFAR, the potential for positive change is limitless. Thank you for the opportunity to testify on these important issues. We look forward to continuing our partnership.