



U.S.-German Forum  
Future Agriculture



# U.S.-German Forum Future Agriculture

Recommendations for the Digital  
Transformation of Agriculture for the  
National Level and Transatlantic  
Cooperation



**Policy**  
**Recommendations**



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## ENCOURAGING DIGITAL READINESS IN DAIRY AND BEEF CATTLE FARMING

Dairy and beef cattle farmers are currently confronted with an ongoing digital transformation of agriculture, revolutionizing the farming landscape. Digital solutions provide a wide range of support options that farmers can use alongside their practical experience in order to further develop their operation for the short and long term. From precision farming technologies and farm management systems to remote sensing and data-driven decision-making tools, digital technologies offer unprecedented potential and can help to optimize production, enhance animal welfare, and mitigate environmental impacts. According to a McKinsey study from 2022, 62 percent of European and 61 percent of North American farmers are currently using or planning to apply at least one technology in their operation within the next two years.<sup>1</sup>

However, the transition to a digitally empowered agricultural sector is not without its hurdles. It demands significant investments in human capital, training, technology adoption, and infrastructure and therefore poses both financial and logistical challenges for farmers. The rapid pace of technological advancements necessitates continuous education and training

of the workforce, along with the ability to quickly adopt new and complementary farming practices. Farmers looking to integrate digital advancements face high investment costs and changing skills requirements for labor. They are confronted with numerous options and conflicting information when attempting to identify the most suitable tools for their businesses, further complicated by the challenges of scaling solutions to various farming operations.

When policies encourage digital readiness, dairy and beef cattle farmers are empowered to embrace innovation, navigate technological complexities, and seize the opportunities afforded by the digital age. In this context, collaboration among farmers, the industry, and policy makers is paramount to develop digital solutions that address fundamental challenges in the sector rather than merely managing symptoms. Together, these stakeholders should develop policies and initiatives to promote digital literacy, facilitate the development of digital resources and solutions which address the various needs of diverse producers, and enable adoption on farms.





## National Level Recommendations

1. Governments should offer farmers direct grants, subsidies, and private-public partnerships based on regional and individual farm needs and technology openness (ensuring that administrative fees for intermediaries are appropriate and reasonable), guaranteeing just and merit-based access to allow farms to adopt new digital technologies that have a positive impact on economic, ecological, and social sustainability.<sup>2</sup>

### Action Points:

- ▶ Governments should fund grants and subsidies for local programs, which have led to concrete and implementable outcomes, focused on educating and training farmers, while providing practical, hands-on experience with emerging digital technologies.
- ▶ Governments should work more closely together with agricultural stakeholders<sup>3</sup> in designing grant and subsidy programs by conducting regular stakeholder meetings, ensuring that the results are also put into action; they should also empower farms by providing more accessible and better information about grant and subsidy opportunities and offering technical assistance in application processes.

2. Governments should offer grants for research and development of new digital technologies that meet the needs of farmers, solve real-world problems, and focus on their practical application.

### Action Points:

- ▶ Funding programs should encourage a bottom-up process by requiring research institutions to engage with farmers and dairy/beef industry partners in the initial project development phase of new digital technologies.
- ▶ Funding programs should require research transparency, for example, by including defined methodology for educating or transferring the information for on-farm use or in the field as well as by creating open-source platforms for knowledge sharing.

3. Governments and agricultural associations should step up their efforts in promoting pathways into animal agriculture as a profession and promote digital skills development in school and apprenticeship systems, ensuring ongoing opportunities for the existing farming workforce, and fostering the next generation of digitally competent farmworkers.

### Action Points:

- ▶ Research and education institutions should develop curricula on digital competencies for secondary and tertiary education institutions as well as vocational and apprenticeship institutions to equip the next generation of farm workers with essential knowledge and skills.
- ▶ Institutions providing continuing education for farmers should offer more opportunities for developing knowledge and hands-on skills by partnering with existing farms or research facilities that have demonstrated adoption of new digital technologies.

## Transatlantic Level Recommendations

1. The Federal Ministry of Food and Agriculture (BMEL) in Germany and the U.S. Department of Agriculture (USDA) in the United States should set up both exchange programs for public officials in the agricultural sector [on the federal and sub-federal level] and for farmers, farmer associations, and advisors, focusing on better governance, sharing knowledge and expertise, as well as identifying fields to increase transatlantic cooperation.

2. The EU and the United States should strengthen the Collaboration Platform on Agriculture and increase the focus on digitalization in the agricultural sector as part of the discussions, conducting regular stakeholder hearings, agreeing on roadmaps for joint action, and increasing information on the platform and its successes.

<sup>1</sup> David Fiocco, Vasanth Ganesan, Maria Garcia de la Serrana Lozano, and Hussain Sharifi, Agtech: Breaking Down the Farmer Adoption Dilemma, McKinsey & Company, February 7, 2023, <https://www.mckinsey.com/industries/agriculture/our-insights/agtech-breaking-down-the-farmer-adoption-dilemma> (accessed June 6, 2024).

<sup>2</sup> Sustainability thus includes the economic viability of farm operations, environmental and climate sustainability, animal welfare, and social wellbeing of farms and rural areas.

<sup>3</sup> Agriculture stakeholders include the full spectrum of farm sizes and organizational structures, as well as intermediary processors, distributors, wholesalers, technical assistance providers, scientists, policymakers, and institutions providing educational services.



## BUILDING DIGITAL-READY FARM INFRASTRUCTURE

Agriculture is a critical infrastructure, vital for national security, economic stability, and the well-being of societies and the environment. Ensuring the resilience and prosperity of this sector is fundamental for maintaining food security and supporting rural economies while protecting biodiversity. This requires farmers acting with foresight as well as reliable and robust hard and soft infrastructure in rural regions. Given the ongoing digital transformation, these infrastructure investments must also focus specifically on supporting digital integration at the farm level.

Reliable internet connectivity in rural areas remains a significant obstacle. According to the U.S. Department of Agriculture, in 2023, 15 percent of farms lacked internet access completely, and only 51 percent had access to broadband.<sup>4</sup> According to 2021 data from the Federal Ministry of Food and Agriculture, in Germany, 83 percent of rural households had access to broadband of 50 megabits per second; only 23 percent had access to the more reliable and faster gigabit network (> 1,000 megabits/second), compared to 78 percent of urban households, indicating a stark urban-rural divide.<sup>5</sup> Inconsistent or slow internet

connections hinder the effective use of digital tools and limit access to real-time data essential for modern farming practices, as does the absence of robust IT service provider infrastructure. Additionally, the establishment of effective infrastructure for streamlined data reporting and management is imperative to enable informed decision-making and ensure adherence to regulatory requirements.

Due to declining rural populations, the agricultural sector also faces a broad set of business challenges such as a limited supply of qualified labor and a dwindling number of supporting businesses. Investments in infrastructure, such as improved transportation networks, education, healthcare, and childcare services, can help mitigate these issues by improving quality of life in these regions. For a successful digital transformation, it is paramount to recognize that investments in infrastructure go beyond mere construction projects; they represent a commitment to the long-term viability and competitiveness of the sector and wellbeing of the population living in rural regions.





## National Level Recommendations

1. Governments need to ensure that the necessary soft and hard infrastructure is in place more quickly to enable farmers to implement digital solutions, which help to achieve global sustainability goals and optimize production processes.

### Action Points:

- ▶ Governments must allocate sufficient public funding for timely infrastructure investment and encourage private sector investment to ensure comprehensive coverage and also take into account more strongly the needs of farms in digital infrastructure planning by creating expert groups and conducting more stakeholder meetings in rural areas.
- ▶ The implementation of smart digital solutions for the production and usage of renewable energy on farms should be encouraged to maximize resilience, energy efficiency, and sustainability and simplify the permitting process for farms for renewable energy production as well as providing more planning security.

2. Governments need to invest more in infrastructure resilience and emergency management to ensure the functionality and security of the agriculture sector in times of crisis (e.g., energy shortage, cyberattacks, health crises, severe weather events, and war).

### Action Points:

- ▶ Governments should ensure that the agriculture sector is provided with the necessary resources in times of crisis to deal with digital infrastructure disruptions, without imposing overly burdensome regulations and disproportionate requirements and hindering sustainable production.
- ▶ Governments and agricultural associations should enhance risk assessment on farms by 1) offering information material and training, and 2) promoting investment in digital, energy, and internet software safety systems as well as crisis playbooks at the farm level to ensure that farms are better equipped to respond to crises.

3. Bureaucracy needs to be reduced in data reporting infrastructure, first by the government developing a platform to facilitate standardized reporting and second by the agriculture sector itself working towards more standardized forms.

### Action Points:

- ▶ All levels of government should work together to build a streamlined data reporting process for essential metrics, focusing on efficiency, comparability, avoiding double entries, and making it user-friendly.
- ▶ Governments should conduct regular user surveys focusing on the federal and local levels<sup>6</sup> to identify unnecessary bureaucratic burdens and decide on a road map for how to prioritize and implement digital solutions more quickly to reduce these burdens and improve the provision of services for farms.

## Transatlantic Level Recommendations

1. The United States and the EU should use the EU-US Collaboration Platform on Agriculture more effectively to hold structured and regular exchanges on new ways to connect the unconnected, strengthen rural and farming areas, and ensure that policy makers keep their interests in mind in digital infrastructure planning.

2. The U.S. and German governments should create digital collaborative platforms to better inform agricultural stakeholders on both sides of the Atlantic about existing and upcoming regulations and laws as well as allow for an exchange of best practices on how to use digital technologies in agricultural supply chain management, with the goal to facilitate transatlantic trade.

<sup>4</sup> U.S. Department of Agriculture, Technology Use (Farm Computer Usage and Ownership), August 2023, <https://downloads.usda.library.cornell.edu/usda-esmis/files/h128nd689/4j03fg187/fj237k64i/fmpc0823.pdf> (accessed June 6, 2024).

<sup>5</sup> Bundesministerium für Ernährung und Landwirtschaft, Flächendeckende Breitbandversorgung auch in ländlichen Regionen, February 28, 2022, <https://www.bmel.de/DE/themen/laendliche-regionen/digitales/breitband-und-mobilfunkversorgung/breitbandstrategie.html> (accessed June 6, 2024).

<sup>6</sup> This also includes the EU level.



## ADVANCING DATA GOVERNANCE FOR FUTURE-ORIENTED FARMING

The digital transformation of agriculture, driven by technologies such as AI and big data analytics, is fundamentally connected to effective data management and utilization. New technologies generate vast amounts of information on animal and crop health, environmental conditions, and more, providing valuable support for dairy and beef cattle farmers. The ability to collect, analyze, and interpret this data is crucial for farmers and other agriculture stakeholders in making informed decisions, optimizing use of resources, and thereby, improving productivity and sustainability. Robust data governance practices refer to the process of managing the quality, security, availability, and usability of data assets, and are essential for harnessing this potential.

Still, there are significant challenges related to data governance in the agriculture sector. This necessitates proactive measures to address issues of data accessibility, interoperability, and ownership, fostering a collaborative ecosystem wherein stakeholders can share data responsibly and leverage collective insights to address shared challenges. As a critical infrastructure, agricultural supply chains are at risk of disruption through cyberattacks. Making farm data secure against breaches and unauthorized access is an increasingly complex task due to the proliferation of digital agricultural technologies. Although the

agricultural sector has historically not been a core target of cyber-attacks, the sector's foundational role in society and increasing use of digital technologies mean it must be prepared to better identify, prevent, and respond to cyber security threats in the future.

The increasing importance of data also raises crucial questions about data ownership and privacy. Farmers generate massive amounts of valuable data. Balancing partnerships with external actors to harness and utilize this data while ensuring necessary privacy protections and fair compensation for producers is a significant challenge as the sector becomes increasingly digitally integrated.

The lack of interoperability – i.e. the ability for tools and platforms to “talk” to one another – has been a major hindrance for the digital transformation in agriculture. Interoperability is essential for giving farmers and other stakeholders the flexibility to tailor and combine digital solutions which suit their specific needs. Making inroads on these challenges will require a multi-stakeholder approach to standardization, which simultaneously prioritizes usability, data sovereignty, and respects unique interests.







## National Level Recommendations

1. Governments need to work with agricultural stakeholders to ensure that hard and soft technology is more interoperable to allow for more effective and efficient data exchange across technologies, which increases the flexibility of farmers to use different technology systems and improves transparency across the food value chain.

### Action Points:

- ▶ Governments and associated institutions should decide upon and adopt standards for farm data in order to make their digital systems interoperable with on-farm digital technologies and allow digital solution providers to integrate with these systems.
- ▶ Governments should collaborate with and provide funding to established standardization bodies (such as ICAR, AgGateway, ISO, etc.) to promote standards, identify gaps in standardization of agricultural technologies, and develop a database that allows for verifying the interoperability of farm technology and creates a certification scheme.

2. Governments and industry should respond to the privacy concerns of farmers by better safeguarding their rights to retain and access farm-specific data and promoting transparency on the usage of said data across the downstream food value chain.

### Action Points:

- ▶ Policy makers, farm associations, and providers of on-farm technology should collaborate to raise awareness of the importance of data literacy, educate producers on best practices for data management and safety, and inform on how to use the digital tools and insights to improve decision-making.
- ▶ Governments should enforce disclosure among technology companies of data collection and data usage practices and policies as well as empower farmers to opt in or out of data sharing, define data recipients, and be assured of benefiting from the findings derived from their data.

3. Agricultural stakeholders should work together more closely to improve cybersecurity, including better threat detection, prevention, and response in the agricultural sector.

### Action Points:

- ▶ Public institutions and industry should be held responsible for addressing vulnerabilities in their systems through more secure software, hardware design, and ongoing data security training for employees and customers.
- ▶ Given that cyber security is an essential concern, agricultural stakeholders should jointly host cyber security summits to raise awareness and develop strategies for dealing with security risks, while public education should address the importance of cyber security at all education levels.

## Transatlantic Level Recommendations

1. The United States and the EU should create a working group (composed of government officials, members of standardization bodies, industry stakeholders/representatives, and farmers) to provide a framework for standardizing reporting metrics and best practices for data governance between the two economies, which could serve as a model for global standardization efforts, increase interoperability, and facilitate access to two of the world's leading economies.

2. The U.S. and German/EU governments as well as agricultural associations should step up their efforts in informing and educating agricultural stakeholders on the EU-U.S. Data Privacy Framework and its relevance for the transatlantic exchange of data in the agricultural sector and work towards a joint framework on data ownership.

## ABOUT THE PROJECT

The U.S.-German Forum Future Agriculture, led by the Aspen Institute Germany together with implementing partner, the University of Illinois Urbana-Champaign, aims to promote transatlantic dialogue on common challenges for the field of agriculture and rural regions and pave the way for a more sustainable agricultural future. Germany and the United States face similar challenges, but a better mutual understanding of different agricultural practices and standards is needed to provide joint global leadership that contributes to shaping the future of agriculture. By bringing together U.S. and German farmers and other key agricultural stakeholders from research and business, the forum addresses precisely these challenges and invests in transatlantic exchange in rural communities.

In its second year, the project has convened 16 participants active in the field of dairy and beef cattle farming from the Northeastern U.S. and Northwestern Germany. Between January and June 2024, the first cohort met for twelve virtual workshops and one four-day meeting in Kiel, Schleswig-Holstein. The

core thematic focus of this year's cohort is the digital transformation in agriculture. Throughout the online and offline program components, participants have had the chance to learn about agricultural practices and policies in each other's countries, conduct site visits to see best practices and innovative solutions, engage with policymakers, and explore opportunities for transatlantic collaboration. In addition to a general exchange of practical experience, the project also seeks to influence the broader policy conversation at both the national and transatlantic levels. As such, the group developed policy recommendations related to digitalization and agriculture in the dairy and beef industries for the national and transatlantic levels. The ensuing recommendations are a consensus of the group and reflect the diverse personal experiences, expertise, ideas, and opinions of each participant.

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## ABOUT THE ASPEN INSTITUTE GERMANY

The Aspen Institute Germany is an independent, non-partisan organization that promotes values-based leadership, constructive dialogue between conflicting parties, and transatlantic cooperation to strengthen a free and open society. Founded in 1974 in Berlin, the Institute has been bringing together decision-makers and experts from politics, business, academia, media, culture, and civil society for 50 years to address the challenges of our time.

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