Modernizing Agricultural Data Dissemination: Lessons from USDA NASS's Data Dissemination Initiative[1]

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Abstract

The USDA's National Agricultural Statistics Service (NASS) is reimagining how it delivers agricultural data through its Data Dissemination initiative—a comprehensive modernization effort that replaces static PDF reports with a dynamic, cloud-native platform. This initiative is designed to improve usability, accessibility, and operational efficiency, with features like mobile responsiveness, 508 compliance, quadrant-based data views, exportable visualizations, and embedded metadata.

As part of this transformation, the team has also conducted extensive research into AI-powered chatbots to support intuitive, conversational access to statistical data. The team has developed a robust set of design notes and technical insights on making structured data more AI-ready. This includes lessons on prompt engineering, slot filling, hallucination mitigation, and the challenges of aligning generative models with official statistics. These findings offer practical guidance for agencies exploring how to responsibly integrate AI into public data services.

This paper will illustrate how this initiative facilitates producers' ability to access and analyze data independently, without the need for third-party tools. It will also demonstrate how these advancements are optimizing internal workflows, reducing the time staff spend on report generation, and paving the way for future enhancements. Attendees will gain insight into how

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contemporary dissemination strategies can enhance transparency, strengthen service delivery, and equip statistical systems to meet the needs of the next generation of data users.

Keywords: agricultural statistics; data dissemination; modernization; metadata; user experience; accessibility; AI-ready data

1. Introduction

The National Agricultural Statistics Service (NASS) of the United States Department of Agriculture (USDA) is responsible for the publication of over 400 agricultural statistical publications annually. Production and supplies of food and fiber, prices paid and received by farmers, farm labor and wages, farm finances, chemical use, and changes in the demographics of U.S. producers are only a few examples of the many publications produced by NASS (1).

Official agricultural statistics, such as those published by NASS, play a foundational role in economic analysis, policy formation, risk management, market forecasting, and research. For decades, NASS met this mission through traditional dissemination mechanisms: static PDF reports, printed bulletins, static charts, and structured tabular outputs. These formats were durable and familiar, but the digital information environment has evolved dramatically. Producers increasingly rely on mobile devices; analysts depend on machine-readable data; policymakers expect intuitive visualizations; and the broader public now consumes data through interactive dashboards and conversational interfaces rather than documents. (2)

Recognizing these shifts, NASS initiated a major modernization of its dissemination systems. The effort seeks to achieve three overarching goals: (1) improve the accessibility and usability of agricultural data for all user groups; (2) streamline internal production workflows; and (3) create a flexible, scalable foundation capable of supporting future analytic technologies, including AI-driven data access.

In this paper, we will discuss a lot of topics including planning, development, product architecture, user-centered design research, accessibility, metadata governance, workforce transformation, and AI-readiness work. The goal is to distill a set of practical, transferable lessons for statistical agencies undergoing similar modernization efforts.

2. Discussion of Current State

USDA NASS currently disseminates data in a variety of ways – pdf publications and QuickStats being the most common. The PDF releases, as illustrated in figure 1, are very tabular in nature. Each release publication has different setup instructions and the tool used to generate them is built on legacy technology. Security vulnerabilities, staff expertise and time availability are all internal reasons to push away from the pdf releases. (3)

Cattle Inventory by Class – States and United States: January 1, 2025 and 2026

State	All cattle and calves			All cows and heifers that have calved		
	2025	2026	Percent of previous year	2025	2026	Percent of previous year
	(1,000 head)	(1,000 head)	(percent)	(1,000 head)	(1,000 head)	(percent)
Alabama	1,180.0	1,200.0	102	650.0	650.0	100
Alaska	20.0	19.0	95	8.5	8.5	100
Arizona	930.0	870.0	94	360.0	355.0	99
Arkansas	1,560.0	1,560.0	100	850.0	850.0	100
California	5,050.0	5,050.0	100	2,340.0	2,350.0	100
Colorado	2,550.0	2,550.0	100	810.0	830.0	102
Connecticut	45.0	44.0	98	23.0	23.0	100
Delaware	10.5	10.5	100	4.1	4.2	102
Florida	1,560.0	1,580.0	101	960.0	970.0	101
Georgia	980.0	970.0	99	540.0	530.0	98
Hawaii	133.0	135.0	102	74.0	75.0	101
Idaho	2,490.0	2,500.0	100	1,130.0	1,160.0	103
Illinois	1,010.0	980.0	97	410.0	400.0	98
Indiana	800.0	820.0	103	380.0	390.0	103
Iowa	3,500.0	3,450.0	99	1,070.0	1,060.0	99
Kansas	5,950.0	5,850.0	98	1,410.0	1,370.0	97
Kentucky	1,840.0	1,820.0	99	910.0	900.0	99
Louisiana	720.0	680.0	94	425.0	405.0	95
Maine	73.0	71.0	97	35.0	34.0	97
Maryland	154.0	155.0	101	75.0	76.0	101
Massachusetts	31.0	30.0	97	15.0	15.0	100
Michigan	1,110.0	1,120.0	101	540.0	560.0	104
Minnesota	2,090.0	2,100.0	100	780.0	810.0	104
Mississippi	810.0	800.0	99	430.0	420.0	98
Missouri	3,950.0	3,850.0	97	1,920.0	1,860.0	97
Montana	2,160.0	2,140.0	99	1,260.0	1,240.0	98
Nebraska	6,050.0	6,150.0	102	1,620.0	1,610.0	99
Nevada	435.0	420.0	97	265.0	255.0	96
New Hampshire	28.0	28.0	100	13.5	14.0	104
New Jersey	24.0	24.0	100	12.0	12.0	100
New Mexico	1,280.0	1,190.0	93	690.0	660.0	96
New York	1,410.0	1,390.0	99	730.0	750.0	103
North Carolina	720.0	690.0	96	370.0	350.0	95
North Dakota	1,680.0	1,730.0	103	880.0	900.0	102
Ohio	1,240.0	1,230.0	99	530.0	530.0	100
Oklahoma	4,600.0	4,650.0	101	2,000.0	2,010.0	101
Oregon	1,230.0	1,210.0	98	630.0	620.0	98
Pennsylvania	1,370.0	1,400.0	102	660.0	660.0	100
Rhode Island	3.7	3.8	103	1.7	1.8	106
South Carolina	295.0	280.0	95	157.0	147.0	94
South Dakota	3,500.0	3,550.0	101	1,670.0	1,690.0	101
Tennessee	1,570.0	1,560.0	99	850.0	840.0	99
Texas	12,100.0	12,100.0	100	4,750.0	4,750.0	100
Utah	740.0	760.0	103	410.0	425.0	104
Vermont	215.0	220.0	102	126.0	128.0	102
Virginia	1,320.0	1,320.0	100	640.0	640.0	100
Washington	1,120.0	1,120.0	100	465.0	455.0	98
West Virginia	365.0	365.0	100	193.0	192.0	99
Wisconsin	3,250.0	3,250.0	100	1,540.0	1,560.0	101
Wyoming	1,220.0	1,160.0	95	660.0	630.0	95
United States	86,472.2	86,155.3	100	37,272.8	37,175.5	100

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Figure 1: PDF Release Example – Cattle 2026

The other primary avenue of data dissemination in the current state is QuickStats. QuickStats remains the agency's primary repository for published estimates, offering GUI-based access, a robust API, and nightly full-table data exports that support analytical workflows across the agency and the public.

At the same time, the system carries several well-recognized limitations. Its scale, schema complexity, and historically layered design can create challenges for both users and developers, including high query volumes, slower performance during peak usage, and restrictions such as a 50,000-row API cap. The legacy GUI, shown in figure 2, presents additional constraints, and the platform's large accumulation of saved queries and parameters over time adds complexity for maintenance and navigation. Despite these issues, QuickStats continues to function as the cornerstone of NASS's dissemination environment, relied upon daily for research, operational decision-making, and downstream data products—while simultaneously underscoring the need for a modernized, cloud-native system that improves usability, performance, and long-term sustainability. (4)

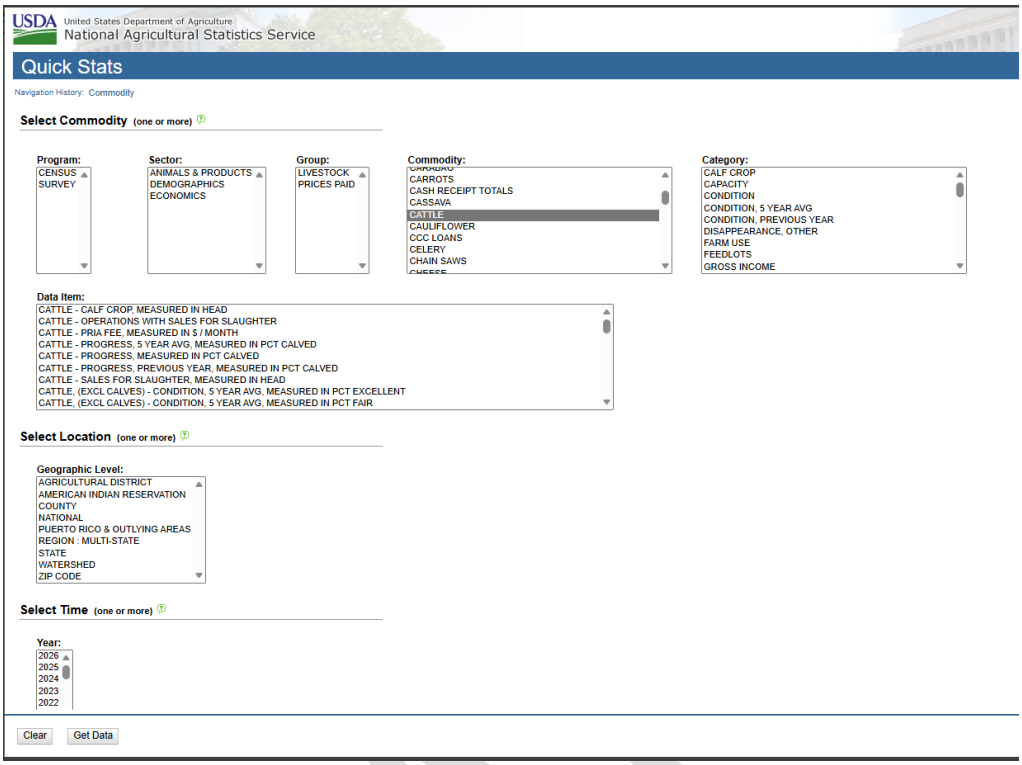
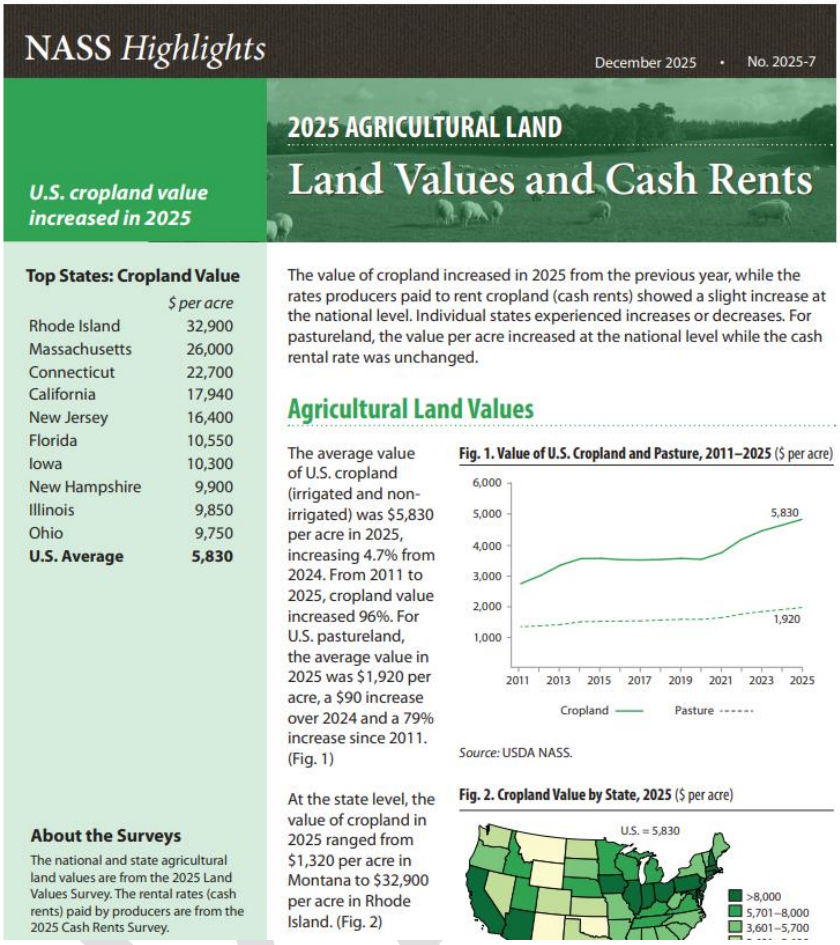


Figure 2: QuickStats GUI

Lastly, a less common, but valuable dissemination route for USDA NASS data is via highlights documents. These documents are release specific and custom created for individual releases. Due to the level of effort to build these, only a handful of releases at NASS currently offer a highlights document. As shown in figure 3, these documents are designed to be a concise summary, with nice visuals that describe a report. However, due to their pdf nature, they also have limitations around interactivity and allowing the ability for the user to dive deeper into the data.



NASS *Highlights*

December 2025 • No. 2025-7

2025 AGRICULTURAL LAND

Land Values and Cash Rents

U.S. cropland value increased in 2025

Top States: Cropland Value

	$ per acre
Rhode Island	32,900
Massachusetts	26,000
Connecticut	22,700
California	17,940
New Jersey	16,400
Florida	10,550
Iowa	10,300
New Hampshire	9,900
Illinois	9,850
Ohio	9,750
U.S. Average	**5,830**

About the Surveys

The national and state agricultural land values are from the 2025 Land Values Survey. The rental rates (cash rents) paid by producers are from the 2025 Cash Rents Survey.

The value of cropland increased in 2025 from the previous year, while the rates producers paid to rent cropland (cash rents) showed a slight increase at the national level. Individual states experienced increases or decreases. For pastureland, the value per acre increased at the national level while the cash rental rate was unchanged.

Agricultural Land Values

The average value of U.S. cropland (irrigated and non-irrigated) was $5,830 per acre in 2025, increasing 4.7% from 2024. From 2011 to 2025, cropland value increased 96%. For U.S. pastureland, the average value in 2025 was $1,920 per acre, a $90 increase over 2024 and a 79% increase since 2011. (Fig. 1)

Fig. 1. Value of U.S. Cropland and Pasture, 2011–2025 ($ per acre)

Source: USDA NASS.

At the state level, the value of cropland in 2025 ranged from $1,320 per acre in Montana to $32,900 per acre in Rhode Island. (Fig. 2)

Fig. 2. Cropland Value by State, 2025 ($ per acre)

Figure 3. Land Values and Cash Rents Highlights Document

3. Problem Definition and Motivation

The historical dissemination workflow is efficient for a document-centric world but increasingly inefficient in a data-centric one. Statistical releases are produced in multi-page PDFs requiring manual navigation and cross-reference. Users who needed time-series queries, multi-state comparisons, or machine-ready extracts were required to either manually copy tables or navigate separate access tools such as QuickStats. The distribution of insight, therefore, relied heavily on user effort rather than platform capability.

Accessibility limitations posed additional challenges. Many legacy reports required manual remediation to meet 508 standards, an effort that grew increasingly burdensome as the diversity of visual elements (maps, charts, footnotes, multi-span tables) expanded. Internally, staff spent considerable time formatting publications, ensuring consistency across reports, resolving table layout issues, and troubleshooting ad-hoc dissemination requests.

User expectations also evolved. Producers began to expect intuitive interfaces that provided local-level statistics quickly. Analysts and researchers increasingly needed automation-friendly

outputs, robust metadata, and direct export functionality. Policy stakeholders needed clean, at-a-glance summaries supported by interactive detail. Traditional formats could not efficiently meet these requirements.

These pressures made modernization not just a technical necessity but an operational and mission-critical one. A new platform would need to present information in multiple modes—visual, tabular, geographic, and metadata-rich—while supporting fast navigation, mobile devices, and a more sophisticated understanding of user intent.

4. Platform Architecture and Design Principles

The redesigned dissemination platform was conceived as a cloud-native system built around modularity, scalability, and interoperability. While traditional workflows centered on static file production, the modern platform centers on a dynamic data pipeline capable of serving multiple front-end visualizations concurrently.

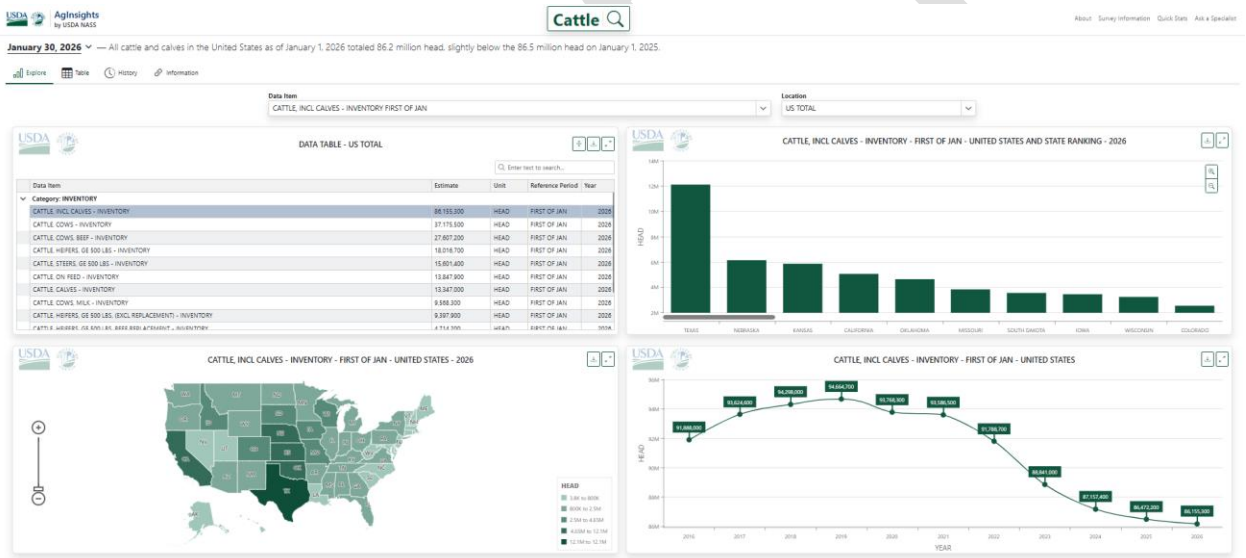


Figure 4. Ag Insights Desktop View

The architectural design includes a structured ingestion layer, a harmonized metadata layer, API services that deliver standardized datasets, and a presentation layer optimized for interactivity and responsiveness. A key design innovation is the quadrant-based interface, which simultaneously displays a map, table, chart, and metadata panel. This design supports rapid interpretive transitions: users can see geospatial patterns, numerical detail, temporal change, and methodological context without switching screens.

Accessibility is embedded into the architecture rather than retrofitted. Reusable components—such as table renderers, charting modules, and metadata displays—are designed according to 508-compliant best practices, including color-contrast conformity, screen-reader compatibility, predictable keyboard navigation, and descriptive alt-text structures. This reduces downstream remediation and ensures equitable access to information.

Metadata modernization plays a central role. The platform requires consistent and machine-readable metadata for every series, column, and attribute. This includes definitions of units, domains, reference periods, estimation methods, disclosure limitations, and sample design notes. By integrating metadata directly into the dissemination interface, users gain transparency, and analysts gain confidence that automated ingestion will preserve context.

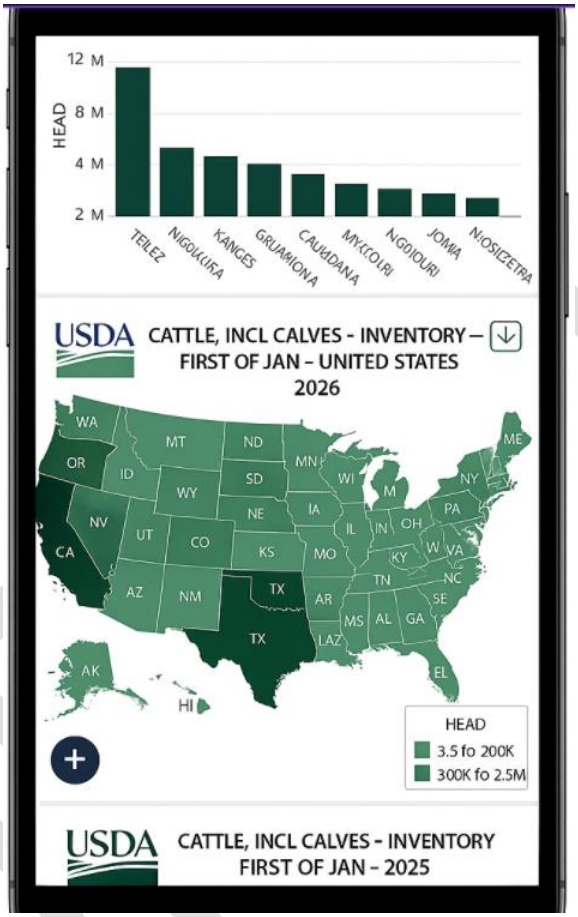


Figure 5. Ag Insights Mobile View

5. Preparing Official Statistics for AI and Conversational Interfaces

A distinctive element of the modernization is the agency's exploration of AI-enabled access. As generative AI tools mature, NASS seeks to understand how its structured statistical datasets can be made ready for conversational interfaces—whether internal (workflow automation) or external (public-facing knowledge tools).

Early experimentation revealed several challenges typical for statistical agencies: generative models often hallucinate when underlying data structures are not explicit; geographic terms require disambiguation; agricultural terminology (e.g., "stocks," "utilization," "condition

ratings") can be misinterpreted; and statistical constraints—such as revision rules, confidentiality protections, and domain specificity—must be accurately reflected.

Insert more emphasis on the failures of what we tried

This is a placeholder – Databricks Genie – Currently finalizing some testing

Further detail forthcoming on successes and failures after some further analysis, including benchmarking

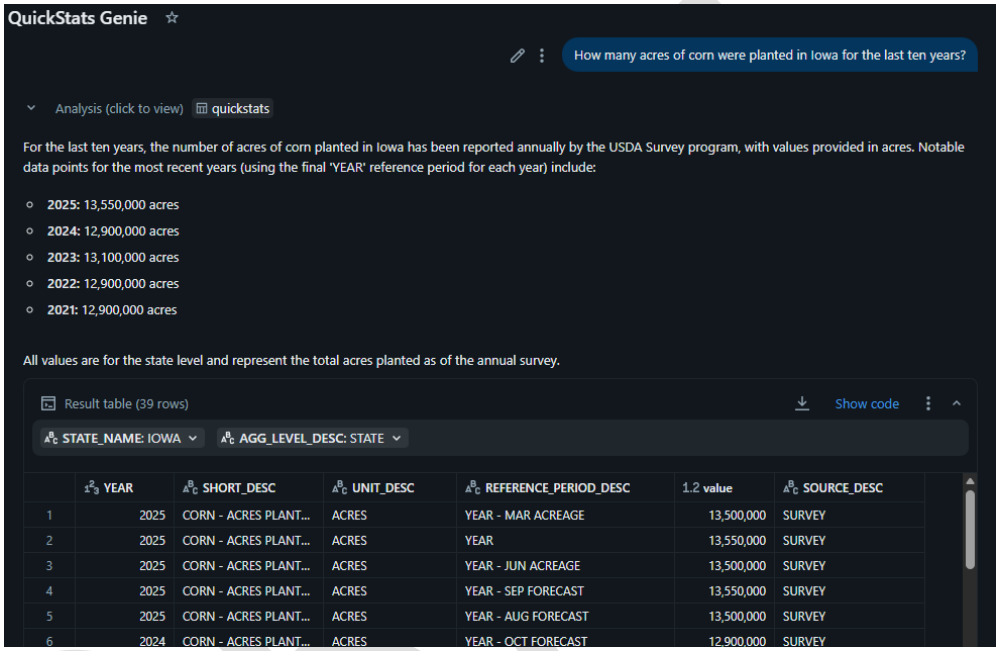


Figure 6. QuickStats Genie

6. Implementation and Workflow Transformation

The transition from static dissemination systems to a cloud-native interactive platform required a multi-layered shift in NASS's internal operations. One of the core implementation pillars was the redesign of the publication workflow. Historically, individual reports required manual formatting, table reconstruction, and document remediation prior to release. The modernization effort replaced this with automated pipelines that generate tabular, graphical, and metadata-rich outputs simultaneously. This not only reduces staff time spent on repetitive tasks, but also creates consistency across outputs and mitigates the risk of human error.

A critical milestone was the launch of structured beta testing periods. These beta testing periods allowed staff across NASS were engaged to explore the system, complete guided test exercises, and provide standardized feedback through surveys and webinar sessions

These iterative cycles allowed the development team to refine UI behaviors, resolve functional inconsistencies, and validate the quadrant-based interface with real user workflows—including testing navigation patterns, export functions, chart interactions, and geographic filters.

The transformation also required sustained coordination across IT units, cloud engineering teams, and subject-matter experts. These exchanges reflect the broader theme of modernization: not just introducing new technology, but synchronizing people, processes, and systems in order to support it.

This alignment ensures that modernization does not disrupt the statistical production cycle and preserves confidence in official agricultural statistics.

7. Stakeholder Engagement and External Value

Stakeholder engagement played a defining role in shaping the design and functionality of the new dissemination platform. Producers, analysts, academic researchers, commodity groups, and internal program leaders each articulated unique needs. Producers emphasized rapid access to local-level statistics on mobile devices. Analysts sought streamlined extract capabilities, uniform metadata, and features that facilitated comparative analysis. Internal staff emphasized the need to reduce publication complexity and eliminate inconsistent table structures.

Training and communication efforts were essential to ensure adoption. A structured change-management approach that included demonstrations, Q&A sessions, office hours, and feedback loops designed to familiarize staff with the new interface and its implications for their work. These sessions helped users understand the rationale behind the modernization and allowed them to practice interacting with quadrant views, updated metadata displays, and export tools.

Externally, the platform's value is rooted in its ability to reduce friction in accessing official statistics. By presenting data through multiple synchronized views, users can more quickly interpret patterns across commodities, geographies, and time horizons. The improved metadata framework enhances transparency, enabling users to comprehend how estimates are constructed and which methodological constraints apply. For the agricultural research community, the platform's clean data extracts and harmonized structures reduce the need for preprocessing, speeding the path from raw statistics to analytical insight.

placeholder-finalizing external user testing feedback prior to ICAS

8. International Relevance and Lessons Learned

While the modernization initiative is rooted in the U.S. agricultural statistics system, the lessons that emerged are broadly applicable to national statistical offices navigating similar transformations. The first lesson relates to metadata: agencies must treat metadata as an operational asset, not as supplementary documentation. The consistent articulation of units,

domains, definitions, and reference periods forms the foundation for trustworthy, interpretable data.

The second lesson concerns accessibility. M8odern information systems must be accessible by design, not as a post-production adjustment. Embedding accessibility principles in interface components and workflow pipelines reduces remediation burden and ensures equitable access.

A third lesson pertains to the role of user-centered design. Stakeholder research should not be treated as a preliminary step, but as an ongoing feedback mechanism that continually shapes platform development. This includes not only traditional usability testing, but also monitoring real-world usage patterns, identifying friction points, and conducting structured interviews with analysts and producers.

Finally, modernization must be understood as a process of organizational change, not solely a technical upgrade. Success depends on coordinated governance, transparent communication, and the alignment of IT, program, and methodological actors. As seen in NASS's experience, even seemingly small changes—such as adjusting grid interactions, refining chart loading behavior, or reorganizing domain groupings—require deliberation, cross-team communication, and iterative validation.

9. Conclusions

This data dissemination initiative marks a foundational shift in how NASS fulfills its mission in a rapidly evolving data environment. By transitioning to a dynamic, cloud-native dissemination system, the agency has positioned itself to deliver faster, more transparent, and more analytically useful statistical products. The modernization strengthens internal workflows, reduces reliance on manual formatting, enhances accessibility, and prepares the agency for next-generation data access models, including conversational AI.

The initiative also demonstrates that modernization is not simply about adopting new technology—it is about cultivating adaptability, improving user experience, and enhancing the statistical system as a whole. The lessons derived from this effort can inform peer agencies worldwide, especially as governments increasingly emphasize transparency, interoperability, and data-driven decision-making.

The work is ongoing, but the foundation built through this initiative provides a robust platform for continued innovation, including expanded metadata integration, improved geographic visualization tools, and new capabilities for AI-assisted data interpretation.

References:

i. Journal Article

Sulistiani I, Caroline C, Syarifuddin. Changes in public information consumption patterns in the digital era: a literature study on digital journalism. MORFAI JOURNAL. 2025;5:204-8.

ii. Website

USDA – National Agricultural Statistics Service. About NASS – Agency Overview [Internet]. Washington, DC: USDA – National Agricultural Statistics Service; 2026. Available from: https://www.nass.usda.gov/About_NASS/

iii. Website

USDA. QuickStats [Internet]. Washington, DC: USDA; 2026 Available from: https://quickstats.nass.usda.gov/

iv. Website

National Agricultural Statistics Service. Quick Stats API [Internet]. Available from: https://quickstats.nass.usda.gov/api. Accessed [2026].