

WHITEPAPER
**INNOVATION
DIALOGUE:
FORGING A SHARED
VISION FOR
SUSTAINABLE BEEF
AND DAIRY**

A systems approach to sustainability in the beef and dairy value chains through the lens of Feed Efficiency.



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THE CONCEPT:

Developed by global agricultural leader Syngenta as part of its *Good Growth Plan*¹ commitments, Innovation Dialogue puts into action the ag tech leader's commitment to innovation for a more sustainable food and agriculture future.

THE GOAL:

To bring together a group of prominent organizations in the beef and dairy sectors to dissect and articulate diverse perspectives and work together to develop a framework for system level sustainability solutions.

¹Syngenta's *Good Growth Plan* has four main pillars: accelerating innovation for farmers and nature, striving for carbon neutral agriculture, helping people stay safe and healthy, and partnering for impact. Syngenta believes that Innovation Dialogues can be used to engage stakeholders and collaboratively explore how innovation can advance sustainability against the backdrop of trade-offs that are inherent in food and agriculture systems.

01

INNOVATION DIALOGUE: FORGING A SHARED VISION FOR SUSTAINABLE BEEF AND DAIRY

The overall business system of stakeholders that brings beef and dairy from *farm to fork* has been remarkably successful and competitive in supplying both the U.S. domestic market and export markets. Yet today, almost no one seems happy with the results:

EVOLVING CUSTOMER CONCERNS:

Nutrition, food safety, animal care, environmental impact, and transparency

Surveys show that 68% of meat consumers want more product information related to:

- Social
- Economic
- Animal welfare
- Environmental practices

and, ultimately how companies embed these considerations into their products.

The Evolution of Consumer Sustainability Preferences

We know certain topics weigh heavier than others. However, the perceptions and emotions shaping purchase decisions may be based on incomplete or deceptive information.

EXAMPLE:

GRASS-FED PRODUCTS

A 'grass-fed' marketing message gives the perception that not all cattle are grass-fed when at one point all cattle are grass-fed.

More relevant questions are whether / what feed is supplemented and the tradeoffs with flavor, health, and environment.

- **Consumers** want beef and dairy products to deliver more health and environmental benefits while maintaining quality and convenience—without paying more for it. Growing global demand for protein - and the respective feed it requires - is perceived to be straining land and water resources while risking vulnerable ecosystems.
- **Farmers** feel pressure on price, climate volatility, consumer demands, and regulation. Further, their perception of a system is that it leaves them with a fraction of the final value to compensate for the complexities and risks of farming and stewarding natural resources.

INSIGHTS, RECOMMENDATIONS, AND CALL-TO-ACTIONS

In March 2020, Syngenta brought together executives from eight organizations² representing different perspectives and stages in the beef and dairy systems to evaluate the potential for a tech-enabled and driven system-wide change strategy to create transformative economic, social, and environmental value.

² The Nature Conservancy, MFA, Five Rivers, JBS, Nestlé, Costco, Palladium, and Syngenta.

INNOVATION DIALOGUE: FINDINGS AND CONSIDERATIONS

Findings:

- Stakeholder perceptions of supply chain system mechanics and on necessary changes as well as suggested changes that generate value across the system (see Figure 1).
- To continue providing customer value, stakeholders must be more deliberate in generating environmental and socioeconomic benefits as well as financial and business considerations.
- In the system today, relationships are primarily transactional resulting in a lack of visibility / understanding of the whole.
- Valuable system change demands a better understanding of all perspectives to align shared outcomes and necessary changes (see Figure 1).

Considerations:

- Beef and dairy have been negatively affected by consumers' health and environmental perceptions, which are not balanced with the positive socioeconomic and environmental contributions of cattle production.
- Consumer exploration (and use) of alternative lab- or plant-based products, driving notable decreases in domestic beef and dairy consumption, continues to shake the industry
- To support the whole, improvements generate a more substantial economic situation for beef and feed farmers. Key opportunities here include financial incentives for farmers with environmental and health outcomes.

As with most food and agriculture systems, the beef and dairy systems' evolution is heavily focused on efficiency. Protein production efficiency is commonly expressed in terms of Feed Efficiency, measured by the feed conversion ratio: *amount of feed used per weight unit gained by the animal being grown.*

With feed a major cost, especially for consolidators, industry innovation must emphasize Feed Efficiency improvements through better, economical feed additives as well as genetic improvement of both feed crops and livestock.

Emphasis on Feed Efficiency brings organizational changes in the value chain and the emergence of intensive feeding.

With corn the primary feed ingredient in the U.S., production and technology practices that support these crops becomes even more critical to stakeholders. Feed and its ingredients have both qualitative and quantitative implications for beef and dairy products including the environmental impacts of Greenhouse Gas (GHG) emissions, water usage, and land requirements.

HOW DO WE ALIGN PERSPECTIVES AND MAKE SOLUTIONS WORK ACROSS THE SYSTEMS?

Key questions:

- What new collaborative, profitable business models exist for farmers and other value-adding stakeholders in the beef and dairy systems?
- How do we better address apparent tradeoffs and dilemmas in balancing commercial, environmental, health, and social needs?
- How does innovation, including the quest for greater efficiency, drive transformative economic, social, and environmental outcomes?

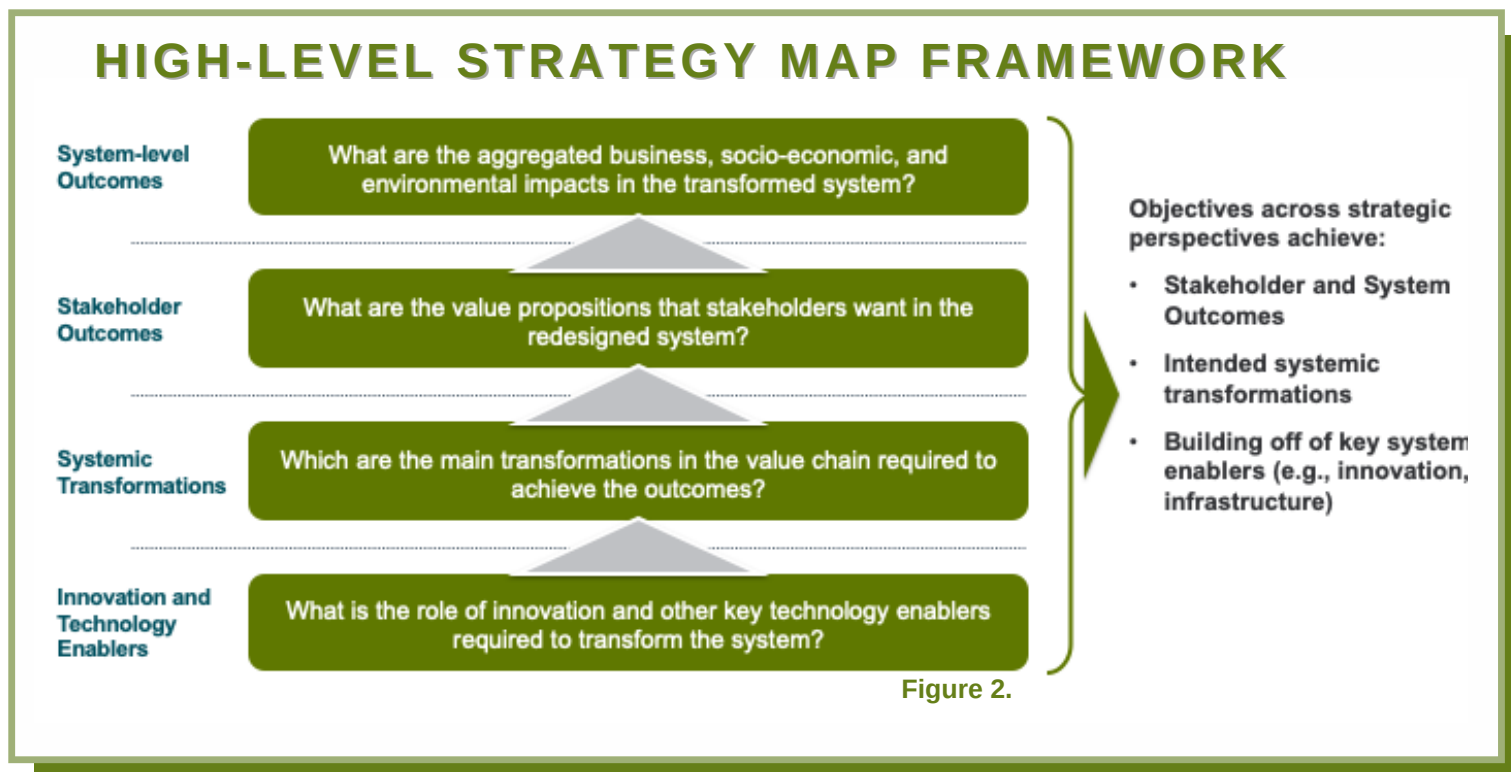


Figure 1.

02

SUSTAINABLE GROWTH: THE PATHWAY TO SYSTEMIC CHANGE

The elements of a **System Strategy Map**, a logical framework to align stakeholders and create systemic change to address the questions outlined above are depicted in **Figure 2**.



SYSTEM OUTCOMES

Despite different perspectives,
system alignment can exist with
shared business, socio-economic,
and environmental outcomes.

- **Grow revenues** for system stakeholders by inclusively expanding the overall value creation to benefit all.
- **Ensure business sustainability** by increasing competitiveness relative to substitute products from economic, health, and environmental perspectives.
- **Maximize environmental efficiencies** by reducing resource-based inputs and GHG emissions per unit of output.
- **Advance well-being and lifestyles** across the ecosystem, including healthy landscapes, environments, and communities.

Successful outcome delivery requires:

- Defining and following through on appropriate metrics and performance indicators.
- Developing new types of commercial relationships.
- Fostering greater transparency and traceability for trust building.

Shared outcomes should bring stakeholders together in long term commercial relationships while delivering consumers products that are differentiated by the delivery of these outcomes.

STAKEHOLDER OUTCOMES

While collaborating on strategies differentiated by the ability to achieve shared outcomes, stakeholders want to know their engagement also yields material results of importance to them:



AGRICULTURAL TECHNOLOGY AND INPUT PROVIDERS:

Driving company growth with technologies that ensure healthy food and agricultural ecosystems is of prime importance.

Example: Syngenta Enogen® corn improves Feed Efficiency and animal health while reducing resource requirements per unit of output.

Successful implementation mean higher sales and market share for this technology, but also delivers value across the system with measurable environmental impact.

INNOVATION AT WORK

Realizing the Value of Preserving Grasslands

Cattle grazing plays an important role in preserving the natural grassland landscapes of the U.S. High Plains. Capturing the potential value, including GHG improvements relative to intensive agriculture, will be advanced by measures that help farmers and other stakeholders monetize the eco-system services.

FARMERS:

Of the 700,000 cow / calf farms in the U.S., about 90 percent are small family operations with an average of 44 head of cattle; typically a secondary source of income. Upon weaning, calves from small operations sell quickly at the best prices to stockers and backgrounders. This often happens through third-party auction barns (inhibiting traceability today).

As with many small farms, financial profitability is an issue. Only 10 percent of all cattle producers have more than 100 head (many in the West) and tend to seek benefits from developing direct and long-term supply relationships with feedlots and processors.

Opportunity also exists with the innovation of feed crop production (not just with feed type). Cover crop use, regenerative agriculture, and low till agriculture all lead to better sustainability outcomes but need to be valued by the market.

Example: Some of these 'integrated farms' are now experimenting with regenerative agricultural practices such as minimizing tillage and using cattle manure for fertilization.

High motivation for mixed farms with feed crops and cattle comes with maximizing the value of the cattle and dairy through Feed Efficiency

CONSOLIDATORS:

For the beef system, corn-based feed connects into the value chain primarily through feedlots, which are traditionally the principal drivers of efficiency in beef systems. Consolidators capitalize on grain surpluses and economies-of-scale to feed livestock in a central location.

Today, some 5 percent of feedlots fatten over a thousand head of cattle at a time, and account for 80 percent of all U.S. beef. Corn is a main ingredient used in cattle feed with around a third of all U.S. corn produced going towards feed, usually as part of a corn / soy rotation (with the soy meal also used for feed).

For major grain consolidators and traders, identity preserved corn or initiatives to enhance feed traceability requires significant investment in the ability to segregate. The feedlot option is to source more directly from local grain farmers or aggregators.

There are also tools that enable more precision in ration decisions, thus improving the finishing quality and market performance, while increasing feed efficiency by avoiding the over provision of feed.

Feed Efficiency is hugely important to reduce costs, and achieve sustainability targets, like lower GHG emissions.

PROCESSORS:

This segment is dominated by four major companies on the beef side represent 80 percent of current capacity. They face intense pressure to influence their supply chain to align with consumer interests (e.g., animal welfare, environment, health).

Dairy processing involves large scale dairies and consumer product companies. They are increasingly moving to differentiate products and brands around a range of attributes including organic, grass-fed, natural, convenience, and no hormones.

Successful outcomes include full traceability to back up these attributes and the development of a reliable, motivated network of suppliers.

RETAILERS AND FOOD SERVICES:

These consumer-facing stakeholders are highly sensitive to evolving consumer preferences, including the growing demand to know where food comes from and what is in it.

By virtue of their position in the value chain they are increasingly able to insist on traceability, certifications, and other supplier requirements.

Successful outcomes for consumer-facing stakeholders means securing a reliable and differentiated supply chain that provides consumers value for money.

CIVIL SOCIETY:

Since landscapes cannot speak for themselves, civil society and Non-Governmental Organizations (NGO) articulate this perspective. They seek greater value accruing to the restoration or preservation of landscapes and natural resources, as well as to climate-conscious agricultural practices that minimize GHG emissions. Improved practices include crop rotation systems that incorporates minor grains and pulses (thus incorporate supporting soil health and biodiversity) and no / low-till practices that allow agricultural land to act as carbon sinks. They also advocate restoring natural grasslands for livestock that have been converted to intensive agriculture.

Successful outcomes hinge on competitiveness of the returns to landowners and farmers from environmentally beneficial practices against the current operations compared to current practices that are perceived to degrade landscapes and resources.

SYSTEMIC TRANSFORMATION

These stakeholder perspectives indicate that achieving system-wide outcomes require new relationships and programmatic initiatives as seen in [Figure 3](#). We discuss these in more

detail in Section 3 below, but they fall into three overlapping and synergistic categories or themes:

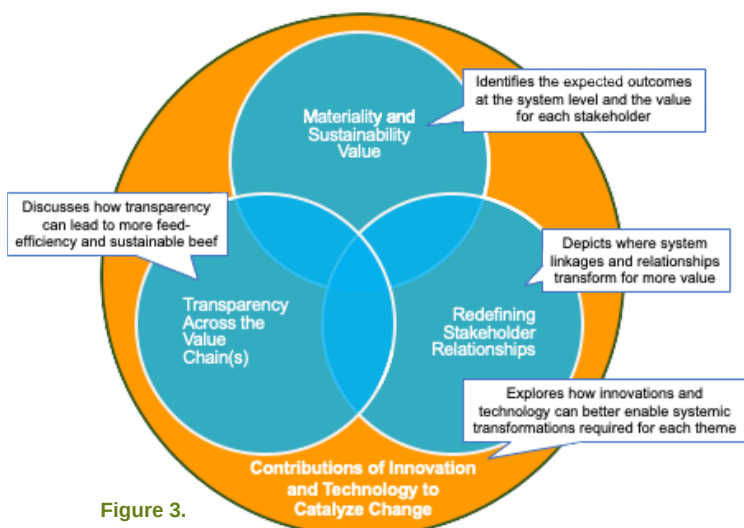


Figure 3.

- 1. Defining materiality and sustainability value**, or the shared measures for system-level and stakeholder outcomes necessary to guide all other initiatives.
- 2. Redefining stakeholder relationships**, both commercial and pre-competitive collaborations, to differentiate the system and the value generated on the basis of materiality measures.
- 3. Ensuring transparency and traceability across the system** for a two-way flow of information and trust among the stakeholders

INNOVATIONS AND TECHNOLOGY ENABLERS

As depicted in Figure 3, innovation and technology play a catalytic role in driving the changes needed to achieve the desired outcomes. To more effectively deploy innovations and technologies, guidance is needed on shared outcomes and considerations of the types of tradeoffs that affect the beef and dairy systems. In Section 3, we review how innovations and technologies enable end-to-end traceability and transparency as well as how to create efficiencies in resource use, reductions in net GHG emissions, and improved animal and human health—Enogen® corn is one such example (see text box).

THE SYSTEM STRATEGY MAP

The Figure 4 System Strategy Map integrates the above strategic perspectives, primarily for the U.S. beef system, but is also applicable to the dairy system. While the Strategy Map has been prepared for these systems, the methodology holds true for any food system. Specific technology enablers and programmatic initiatives presented here reflect the participating organizations as representative of opportunities consistent with the overall system strategy. Other organizations will undoubtedly see additional opportunities that build on other innovations and technologies.

Key insights from this Feed Efficiency Innovation Dialogue focus on working collaboratively towards systemic behavior change with measurable and shared outcomes.

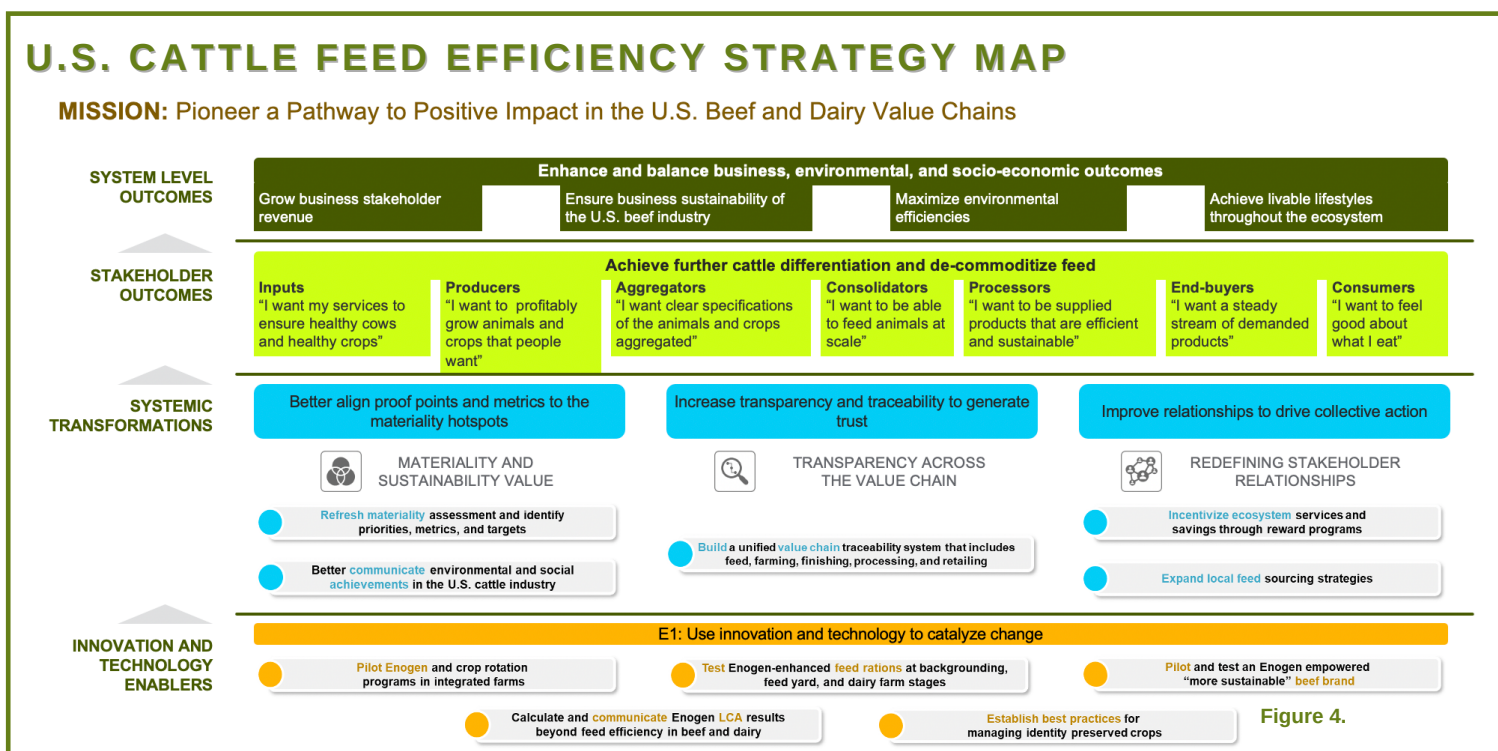


Figure 4.

INNOVATION AT WORK

Corn Technology Enabling Systemic Change

Enogen® corn from Syngenta leverages an in-seed enzyme technology to enhance growth with fewer resources.

While initially used in U.S. ethanol production, Enogen shows potential to bring value to the U.S. beef and dairy systems. Because Enogen requires less environmental inputs per pound of grain than conventional corn, the technology has the potential to reduce the environmental footprint of cattle industries. The ability to do is based, in part, on Enogen's characteristics of better digestibility and starch absorption in the cattle themselves, which allows for healthier herds and less feed required per animal. Besides the characteristics of the crop, business ecosystem services, such as strict identity preservation practices by Enogen growers, empowers the cattle industry with innovations that enable progress towards more sustainable beef and dairy.

SYSTEMIC TRANSFORMATIONS

The change initiatives in the Innovation Dialogue identify shared economic, environmental, and social benefits that can be bundled into the three themes shown in Figure 5.

KEY THEMES IN FEED EFFICIENCY



Theme 1: Materiality and Sustainability Value

- Sustainability measurements
- Value to end consumers
- Branding beef, brand purpose, and communication
- Incentives for ecosystem services
- Value for efficiency
- Adaptation to different models and communities
- Customer-centric approach



Theme 2: Transparency Across the Value Chain(s)

- Feed traceability
- Live animal and meat traceability
- Value chain visibility
- Animal/meat batch passport to retailer
- Going beyond safety and recalls (sharing sustainability information)
- Farmer/Rancher feedback loop
- Who pays, why, and how



Theme 3: Redefining Stakeholder Relationships

- Cow-calf to stocker and feed yard
- Grain/feed to stocker and feed yard
- Feed yard to retailer & consumer
- Integrated cow-calf and feed
- Small-scale and large-scale cow-calf operations
- Consumer and retailer expectations of the value chain
- Packer relationships with consumers

Figure 5.

THEME 1: MATERIALITY AND SUSTAINABILITY VALUE

The first step is to define and measure desired outcomes in ways that are meaningful to the system stakeholders, answering the following questions:

- How can proof points better align with materiality hotspots across the value chain?
- How does materiality reflect the perspectives of system stakeholders and how do we best address sustainability hotspot innovations in Feed Efficiency?
- How do stakeholders align around certain issues and what gaps are most material to each?

Materiality, and the ability to measure and communicate meaningful value across the system, drives important systemic and behavioral change. This involves telling *farm to fork* product

stories through emotional benefits that deeply resonate with consumers. Not only does this inform decisions, it also differentiates the product and unlocks greater value through market positioning. Opportunities to communicate positive socioeconomic and environmental benefits are often overlooked.

For instance, in biomes such as the American Great Plains, cattle may be the most sustainable option for agriculture, providing an ecological balance that other ruminants, like the buffalo, historically played. Cattle also provide opportunities to transform plant material that is not suitable for human consumption into consumable animal protein. Similarly, innovations in production practices and Feed Efficiency lifts the industry to better ecological equilibriums (e.g., reducing the need for land conversion) delivering emotional and functional benefits. Ranchers validating production claims generally receive premiums on their cattle.

Taking a systemic approach to materiality and sustainability demonstrates how materiality hotspots reflect each stakeholder's perspective, target hotspot actions, and finally quantify and maximize the value of their sustainability efforts.

Materiality related to Feed Efficiency translates into business, socioeconomic, and environmental value.

Financial alignment on what is material to stakeholders across the value chain ensures the resilience of the beef and dairy supply, operations efficiency, and profitability of all businesses. Acting upon material topics provides socioeconomic benefits to the value chain, including the viability of ranching communities and food security.

These benefits extend to environmental conditions such as the symbiosis between ranching and the environment, reduction of negative environmental impact per production unit, land conversion/deforestation reduction, water quality and usage improvements, biodiversity protection, and safeguarding animal health. Considering all this, two main recommendations emerged.

INNOVATION AT WORK

The Nature Conservancy's Beef Materiality Matrix

For The Nature Conservancy (TNC), which focuses on protecting landscapes and water, working with farm and grazing systems is critical to mitigate and protect against climate change. To support these efforts, TNC created a Beef Materiality Matrix to help system stakeholders understand potential environmental impacts and tradeoffs. Since key material aspects of the beef system are GHG, land use, water conservation, and biodiversity, the choices and practices in the feed sub-system efficiency are an important driver of impact. TNC applied the Beef Materiality Matrix in a partnership with a restaurant chain to analyze the flows of cattle and feed across the U.S. and their impact on the corporation's GHG emissions and water use. This helped the company understand the importance of strategies related to feed directly affecting material issues, like water quality, resource availability, biodiversity, etc.

RECOMMENDATION: REVISING MATERIALITY ASSESSMENTS TO DEFINE PRIORITIES, METRICS, AND TARGETS

As sustainability priorities change over time, new materiality priorities must translate to agreed-upon actions, standardized metrics, and measurable targets.

Initiative implementation:

- Refreshing sector materiality assessments to identify shifting priorities.
- Creating an action plan for continuous improvements and iterations.
- Standardizing metrics to measure the priority impacts on beef and dairy.
- Agreeing on a few scoped sustainability targets that require collective action.

How: Advance standards through coalitions such as the United States Roundtable for Sustainable Beef (USRSB). Test in specific sustainability and market differentiation programs.

Next steps: Identify arguments for system changes beyond current environmental and economic considerations (e.g., nutritional benefits per hectare) and identify partners by working backwards through the chain to pinpoint the improvement benefactors.

Measuring success: In addition to updating materiality studies and action plans, outcomes will help drive action in the other two themes—new types of business relationships and greater transparency and traceability.

RECOMMENDATION: BETTER COMMUNICATION TO BUILD TRUST IN THE ENVIRONMENTAL AND SOCIAL VALUE OF THE CATTLE SYSTEM

Initiative implementation:

- Measure and communicate the system's environmental, social, and business value, including neglected, hidden, or intangible benefits.
- The beef and dairy industries must improve direct connections between producers and consumers to encourage dialogue and build emotional benefits for the market.

How:

- Translate cattle industry impacts into tangible and intangible societal benefits.
- Develop a communications plan focusing on cattle industry achievements.
- Research technologies for more direct producer and consumer interactions.
- Promote use cases and communication pathways across the industries.

Next steps:

- The implementing body must first communicate benefits away from calories to a holistic approach on nutrition, health, animal welfare, and environmental and social sustainability.
- It may be beneficial to link with existing efforts such as the sustainability communications program at Dairy Management Inc. and the communications initiatives underway with USRSB and Beef Checkoff.

Measuring success:

- Enhanced consumer perception
- Sales volume
- Adoption of producer-consumer communications protocols

THEME 2: SYSTEM WIDE TRACEABILITY AND TRANSPARENCY

To date, most traceability in the beef system tracks animal health and disease outbreaks. Technologies like U.S. CattleTrace and the Power Calf program help ranchers collect and manage herd health data. Some states (e.g. Kansas) require animal health tracking to manage diseases like foot-and-mouth while also facilitating preferential market access, especially in relation to beef export. However, understanding the full impact of the beef and dairy systems require end-to-end transparency, including feed. Certain export markets, like Japan, require cattle and beef import traceability to include considerations such as genetics.

Tracing additional aspects like feed production and formulations would help consumers and other stakeholders in the system to understand environmental impact per pound of beef as well as changes introduced by Feed Efficiency innovations.

EXPLAINED: TRACEABILITY AND TRANSPARENCY

Traceability tracks a product, its inputs and movement from *farm-to-fork*. It tends to be a one-way flow of information, often required by processors, retailers, and in some cases, regulators.

While technology exists to support traceability systems, one challenge is the cost of collecting data, especially for farmers who do not perceive major value compared to data collection requirements. To-date, only a small percentage of producers participate in ranch-of-origin traceability programs.

Transparency is the free flow of information that provides stakeholders with visibility across the system, building trust.

Transparency is critical to support longer-term stakeholder relationships to develop differentiated market offerings and incentivize farmers and other actors to support traceability systems with critical information.

HOW DO WE ENCOURAGE INCLUSION OF CORN AND FEED WITHIN CATTLE TRACEABILITY AND TRANSPARENCY SYSTEMS? WHAT MECHANISMS AND TOOLS FOSTER TRANSPARENCY THROUGHOUT THE BEEF AND DAIRY VALUE CHAINS?

Opportunity: Consumer skepticism about sustainability claims and the need for better communication on material proof points throughout the chain provides opportunities to create value.

Challenge: Balance the costs / benefits of collecting and managing this information. With respect to the business model for traceability and transparency systems, ultimately they will not be sustainable until downstream players and consumers decide how much the effort is worth and pay for it. Retailers and processors must lead the development. Verified data is necessary for consumers and other outcomes players to be willing to pay more

Potential Considerations:

- Difficulty collecting standardized data across regions and programs using different technologies and frameworks. Producers are often reluctant to share data due to concerns with privacy, value-add benefits, and remuneration. Producers may not have access to data if collection and sharing does not flow both ways--particularly evident with proprietary platforms that seemingly lock data.
- Sufficient value from trust, market access, and differentiation across the system generates more than compensate for the cost of overcoming these problems.
- Consumer trust may increase by providing proof of best-in-class sustainability and additional information, leading to higher demand for cattle products.
- Sharing of 'under-the-hood' information fosters accountability of each stakeholder, strengthening relationships.
- For producers, transparent sharing of information may allow increased / stable market access and closing the narrative divide with consumers.

TRANSPARENCY MAKES IT EASIER TO VALIDATE CLAIMS, WHICH EMPOWERS BEEF AND DAIRY PRODUCTS TO DIFFERENTIATE THEMSELVES IN THE MARKET BY DE-COMMODITIZING THE SYSTEM.

INNOVATION AT WORK: Traceability and Transparency

MFA Programs: Incentives (financial or market access) drive participation

For 20 years, regional midwest-based farm supply and marketing cooperative MFA Incorporated has offered a rigorous, 45-day vaccination program through Health Track, securing price premiums on enrolled cattle.

Incentives encourage participation, be it financial or market access. Building on its success with Health Track, MFA has been incorporating new technologies and innovations to advance end-to-end traceability programs. Recent developments include Ultra-High Frequency (UHF) cattle tagging at feed yards and auctions for quick and easy information access, PowerCalf app developed for mobile data collection and a dash board, and BlockTrust technology partnership with U.S. CattleTrace implement blockchain data management across operations. With these innovations, MFA hopes to bridge traditionally disparate data sets for a unified traceability platform. The app and platform can capture everything related to cattle operations, including geospatial localization showing the number of cattle in specific pastures. With these elements in place, MFA hopes to tie value data with movement data for traceability in the cattle sector. MFA is also looking to expand the capabilities to include other types of data, such as feed and sustainability information. With economic incentives in place (price premiums or increased market access), feed efficiency, feed crops production practices and environmental related outcomes could be added to MFA data.

RECOMMENDATION: BUILDING A UNIFIED VALUE CHAIN TRACEABILITY SYSTEM THAT INCLUDES FEED, FARMING, PROCESSING, AND RETAIL

Recommended traceability initiative: This involves building a broader partnership of system stakeholders to further develop existing efforts like Blocktrust Network with MFA for cattle or AgriEdge® and GrowMore360 for seeds / farming practices, while combining efforts with partners such as U.S. CattleTrace, IMI Global, or Where Food Comes From, Inc. These must integrate the material proof points (see Materiality Theme) to ensure end-to-end information of the elements most pertinent to each stakeholder.

How: Standardized data collection and reporting practices require a comprehensive traceability platform, including feed. Integrated farms (i.e., producers of both feed and cattle) provide an opportunity to test and validate the socioeconomic and environmental benefits of rotating high-performing grains, like Enogen, with other minor grains and feed crops. An appropriate set of incentives encourages farmers and ranchers to actively participate in such systems.

Measuring success: Longer-term success will be measured by the number of value chain organizations integrating expanded traceability systems at the core of their business models and by the extent that reliable information shapes consumer and stakeholder decisions.

THEME 3: REDEFINING RELATIONSHIPS

Redefining relationships between stakeholders for long-term collaboration provides a collective pathway towards enhancing sustainability in the beef and dairy value chains. Collaboration leads to valuable developments that encourage growth, such as rewarding producers who recognize the importance of ecosystem services, realizing key value-added points to offer consumers, establishing more direct communication / feedback throughout the value chains, and creating comprehensive narratives with a coordinated long-term action plan.

INNOVATION AT WORK:

Collaboration in Support of Sustainable Beef

Several Innovation Dialogue participants shared perspectives on how relationships have changed over the years and especially between the hide-on (i.e., live cattle), hide-off (i.e., processed cattle), and industry support components of the value chain.

Between 2010 and 2015 many attempts at multi-stakeholder arrangements. In March 2015, the U.S. Roundtable for Sustainable Beef (USRSB) was established with the goal of building truly collaborative solutions across the sector. Though not initially easy, in the name of industry progress, the USRSB was key in breaking down barriers between stakeholders such as producers, NGOs, feed yards, etc. Building trust up and down the value chain has been the most valuable components of this partnership on the industry's quest to create more sustainable beef. A greater awareness of everyone working together to gain consumer trust was the driving factor.

Collaboration improves consumer trust through 'one-voice' positioning, creating honest dialogue with collaboration taking one of two forms:

COMMERCIAL PARTNERSHIPS AND MARKET DIFFERENTIATION

Forming these inclusive business partnerships requires one or more forward-looking businesses to take the lead—acting on insights made possible by better understanding the overall system dynamics and perspectives. Lead companies serve as the engine to align partners across the system. The companies build business models that enhance their collective competitiveness in the market through innovations that enhance commercial, environmental, and social value. The approach includes testing an identity enabled (e.g., Enogen) feed as part of a 'more sustainable' beef brand.

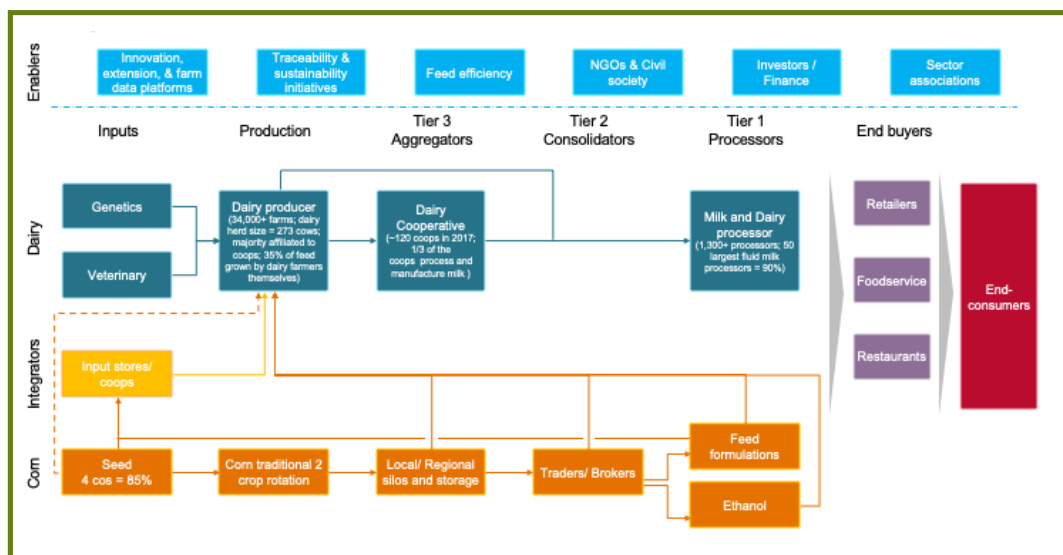
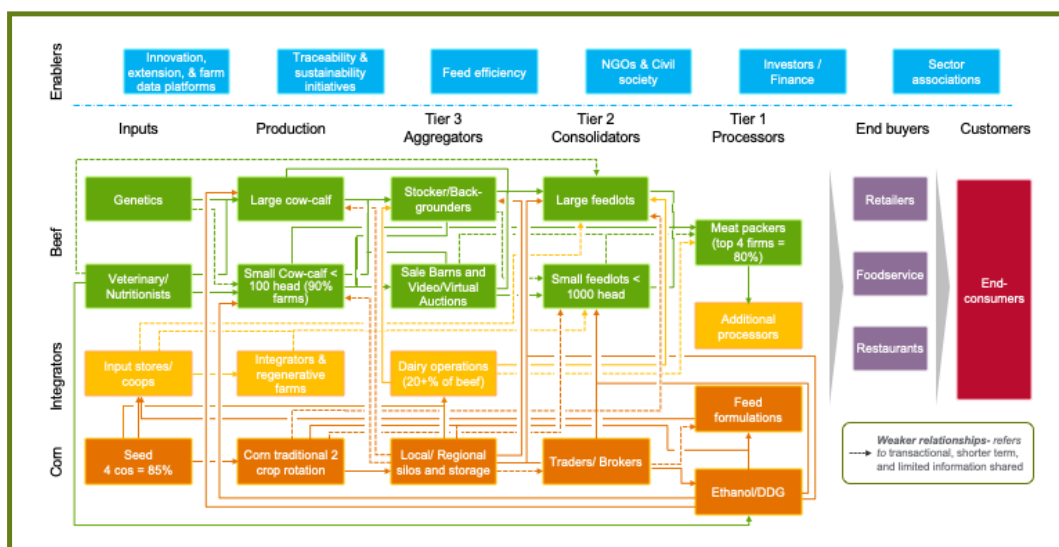
Measuring Success: Commercial partnerships must be inclusive, sharing insight with farmers and custodians of natural resources.

PRE-COMPETITIVE COLLABORATION

A number of relevant coalitions have been formed over the years, such as the Global Roundtable for Sustainable Beef, U.S. Roundtable for Sustainable Beef, and the Beef Checkoff. In addition to providing some specific initiatives for these coalitions to take up, the systems mapping methodology provides a tool for helping participants better understand the overall system, how stakeholder perspectives differ and align, and collaboration opportunities.

Measuring Success: The more information participants get to act on, the greater the potential success of the coalitions.

BEEF SYSTEM



DAIRY SYSTEM

To begin the work of redefining system relationships, the Feed Efficiency Innovation Dialogue generated **two recommendations:**

RECOMMENDATION: INCENTIVIZE ECOSYSTEM SERVICES

Innovation is critical to unlocking the enormous environmental value and impact from regenerative and sustainable production and post-harvest practices. New types of business relationships and models incentivize both the development and adoption of new technologies and practices that regenerate and protect landscapes, biodiversity, land, water and air.

Next steps:

- One commercial approach, likely led by retailers or processors, develops high-value branded products that include transparent, sustainable sourcing. The farmer motivation here is to implement new crop rotations, regenerative or landscape protection practices by reliable market access and pricing, also encouraging technology companies to develop and deploy new products and services.
- Another approach involves mechanisms or platforms that provide or broker voluntary carbon, water, biodiversity, landscape and other ecosystem service credit markets. These emerging markets help companies with environmental liabilities to offset these through initiatives with positive impact. They also help access pools of funding being made available for investment in climate change mitigation. However, these markets often have complex barriers, including difficult requirements for producers to navigate, unstable markets, uncertainty of buyers / demand for credit and price of credits, and a lack of science-based protocols. Advancing this initiative begins by understanding different sustainability markets (e.g., water, carbon, biodiversity), connecting with existing efforts such as Ecosystem Services Marketing Consortium (ESMC), Indigo, Bayer, NORI, and CIBO Technologies, and encouraging new market making entrants.

Measuring Success: Evaluate the number of beef and dairy producers receiving payment for ecosystem services as well as the volume and share of producer incomes from these ecosystem payments.

RECOMMENDATION: EXPAND LOCAL FEED SOURCING STRATEGIES

Structuring proof of concept involving local / regional procurement feed efficient corn (or other feed crops), especially by feedlots, effectively tests the value of identity preservation and market differentiation for beef and dairy including the feed. Forward thinking feedlots testing this approach with producers adopt new efficient feed technologies (e.g., Enogen corn) and interested downstream partners. Integrated farms (including both feed crops and cattle) are another way of testing this approach. Lifecycle Assessment (LCA) studies of technologies like Enogen need to translate to specific environmental and economic value cards for backgrounding, feedlot, and dairy operations. The testing of this approach may benefit from engaging partners such as universities, commercial research facilities, agriculture technology companies, and cattle producers.

Next steps: Implementation may include identifying the business case for efficiency and beginning trials with integrated farmers.

Measuring Success: Measuring the percentages of locally sourced and identity preserved corn (or other feed innovations) and the resulting environmental and economic benefits.

FINAL REMARKS

The U.S. beef and dairy systems face incredible pressure to demonstrate their value to society. With urban consumers often not aware of significant positive socioeconomic and environmental contributions, consumers have been looking for alternative solutions to their protein needs.

Growth of plant- or lab-based protein and plant-based dairy beverages, along with decreases in domestic beef and dairy consumption compounds the competitive stressors on the industry. As explored in this Innovation Dialogue, innovation in Feed Efficiency provides pathways for the U.S. beef and dairy systems to create new sources of value, enhance market access, and differentiate sustainable beef and dairy products. These cannot be taken for granted in a business environment with more complex sustainability demands, disruptive new products, global market trends for sustainability requirements, international competition, and business livelihood risks of smaller players.

The Feed Efficiency Innovation Dialogue has illustrated the transformative potential of Feed Efficiency for U.S. cattle—now we must proactively respond to the calls for change. The Innovation Dialogue demonstrates the potential for the different system stakeholders to come together in framing actionable and achievable plans for evolving the approach to sustainability by aligning it with commercial goals.

At the end of the day, the market and the downstream players will likely be catalysts in driving these transformations for greater sustainability and economic outcomes. Shared economic incentives across the value chain are a must to achieve more sustainability outcomes through enhanced feed efficiency and other innovations. If more economic value is created and fairly distributed, cow-calf and feed crop producers will be more willing to change practices and share information on traceability / transparency systems, and the system will be better off in terms of environmental impacts, product differentiation, consumer trust, and long term feasibility.

The implementation of the systemic transformations outlined in this report requires a collective coordinated effort, full of determination, ingenuity and innovation. Continuous improvement and efficiency-driven initiatives developed in isolation will not be enough to achieve disruptive outcomes. Innovation Dialogue participants believe in the power of collaboration, whether through professionally managed multi-stakeholder interventions or via the creation of well-funded special purpose vehicles. Together, they invite all organizations in the U.S. beef and dairy systems to join this industry-wide effort, an exciting journey to make a lasting impact in the whole industry, the consumers, and the environment.

SPECIAL THANKS

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