

USRSB High-Priority Indicator Goals & Sector Targets





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The U.S. Roundtable for Sustainable Beef (USRSB) is a multi-stakeholder initiative developed with the mission to advance, support and communicate continuous improvement in sustainability of the U.S. beef value chain. The USRSB achieves this through leadership, innovation, multi-stakeholder engagement and collaboration.

The organization’s vision is for the U.S. beef value chain to be the trusted global leader in environmentally sound, socially responsible and economically viable beef.

The USRSB’s scope centers around the mission, vision and strategic objectives of the organization through voluntary adoption of the U.S. Beef Industry Sustainability Framework across the beef value chain with a focus on continuous improvement. This includes education, training and outreach.¹ The USRSB foundations for success are outlined in Figure 1.

U.S. beef provides tremendous societal value, from nutrition to ecosystem services to supporting livelihoods. For example, beef contributes approximately 5% of total calories to Americans’ diets while providing more than 5% of eight essential nutrients: potassium (6.1%), phosphorus (7.3%), iron (8%), vitamin B6 (9.2%), niacin (9.9%), protein (15.2%), zinc (23.1%) and vitamin B12 (25%; Zanovec et al., 2010). The ecosystems services value (e.g., hunting, forage, wildlife, recreational value) of beef cattle grazing lands is conservatively estimated at more than \$24.5 billion (Maher et al., 2021).

At the same time, the USRSB acknowledges there are opportunities to improve outcomes across the three dimensions (environmental, economic, social) of sustainability. For example, greenhouse gas emissions associated with U.S. beef cattle production represent

approximately 3.7% of U.S. greenhouse gas emissions (Rotz et al., 2019; U.S. EPA, 2021). Working to reduce greenhouse gases and other environmental impacts, while enhancing the positive economic, environmental and social aspects of beef cattle production, is core to the USRSB’s mission and vision.

Recognizing that actions to document and improve outcomes are critical and building upon the development and deployment of the U.S. Beef Industry Sustainability Framework, the USRSB has set a strategic objective to establish industry sustainability goals and targets in its 2020-2022 strategic plan. While the USRSB’s efforts are voluntary, the goals and targets set by the organization provide clear priorities for action and leadership to achieve outcomes that meaningfully contribute to the continuous improvement of U.S. beef production.



Figure 1. U.S. Roundtable for Sustainable Beef foundations for success.

¹Out of scope for the USRSB, as an organization, are:

1. Regulatory affairs and legislative lobbying
2. Engagement in business-to-business ventures
3. Mandating of standards and/or verification of individual stakeholder performance

The USRSB has set goals and sector-level targets for all six high-priority indicators: air and greenhouse gas emissions, land resources, water resources, employee safety and well-being, animal health and well-being and efficiency and yield. While each high-priority indicator has its own goal and targets, these components of beef sustainability substantially overlap, often with clear synergies. For example, progress in improving land management will likely have concomitant benefits for reducing air and greenhouse gas emissions, increasing and/or maintaining soil carbon stores, improving water infiltration and reducing nutrient runoff.

Across the diverse membership of the USRSB, we recognize that we must continue to improve to create a better future for generations to come. These goals and sector-level targets are a starting point for accelerating improvements; they are not the endpoint, rather they are a catalyst for the industry to innovate and demonstrate our collective ambition to improve outcomes.

INDUSTRY GOALS



Air & Greenhouse Gas Emissions

The U.S. beef supply chain will achieve climate neutrality by 2040.



Land Resources

The U.S. beef supply chain will work to maintain and improve grazing lands under the care of U.S. beef producers. We will do this by:

- Establishing a baseline for acres under grazing management plans (GMPs) by 2023;
- Achieving 385 million acres covered by a written GMP by 2050; and
- Supporting programs that respect property rights, create value and expand producer capacity to deploy well-managed grazing strategies to ensure lasting legacies founded on conservation and economic success.



Water Resources

By 2050, the U.S. beef supply chain will improve water management strategies and improve water quality. We will do this by:

- Benchmarking water use and quality by 2025;
- Improving retention and capture of nutrients for beneficial use; and
- Supporting feedstuffs growers to achieve their water sustainability goals.



Employee Safety & Well-being

The U.S. beef supply chain is committed to continuously improving the safety, development and well-being of individuals working throughout the industry. We will do this by:

- Reducing the Total Recordable Incident Rate (TRIR) by 50% by 2030 in relevant operations; and
- 10% year-over-year increase in individuals trained for stockmanship and safety through identified programs to reduce injuries on farms and ranches.



Animal Health & Well-being

The U.S. beef supply chain will continue to improve animal health and well-being. We will do this by:

- Strengthening our commitment to the highest standards of animal care; and
- Achieving sector-relevant targets linked to optimal animal care through increased participation in trainings, certification programs and implementation of policies.



Efficiency & Yield

The U.S. beef supply chain will improve efficiencies, enhance product value and increase demand, which collectively will enable operations and businesses to maintain and improve individual and community financial health.

SECTOR TARGETS BY HIGH PRIORITY INDICATOR



AIR & GREENHOUSE GAS EMISSIONS

COW-CALF

Existing metric

Has a grazing management plan (or equivalent) been implemented that protects or improves soil and plant community health, including soil carbon sequestration?

Sector target

385 million acres covered by a written grazing management plan by 2050.

FEEDYARD

Existing metric

Are strategies in place to manage air and greenhouse gas (GHG) emissions?

Sector target

The feedyard sector will reduce greenhouse gas emissions by 10% per pound of beef by 2030.

PACKER & PROCESSOR

Existing metric

LEVEL 1

Are strategies in place to optimize energy efficiency and reduce GHG emissions at company facility(ies)?

LEVEL 2

What is the company's carbon dioxide equivalents (CO₂e) per head or CO₂e per mass of finished product?

LEVEL 3

Does the company make CO₂e publicly available?

Does the company track air and GHG emissions over time and set goals for continued improvement?

Does the company participate in partnerships, initiatives or programs to further GHG reduction and improve air quality?

Sector target

90% of beef processed in the U.S. comes from companies with a GHG reduction strategy, are reporting against that strategy by 2025 and are delivering on their GHG reduction goal by 2030.

By 2030, all beef packers and processors will be taking tangible action to achieve an approved science-based target to reduce emissions in line with limiting global temperature increases to well below 2 or, ideally, 1.5 degrees Celsius relative to pre-industrial levels.

RETAIL & FOODSERVICE

Existing metric

LEVEL 1

Has the company assessed its scope 1 and 2 GHG emissions?

LEVEL 2

Does the company have a plan to reduce its scope 1 and 2 GHG emissions?

Has the company assessed the scope 3 GHG emissions of its beef value chain?

Does the company engage suppliers and encourage adoption of USRSB air and GHG metrics in its beef value chain?

LEVEL 3

Is the company participating in a credible external system reporting for GHG emissions?

Has the company set credible GHG emissions targets?

Can the company demonstrate progress towards these targets?

Sector target

All USRSB member retail and foodservice companies have set credible GHG reduction goals to reduce scope 1 and 2 emissions by 2023;

All USRSB member retail and foodservice companies have set credible GHG reduction goals for their company to reduce scope 3 emissions and are publicly reporting progress by 2030; and

All USRSB member retail and foodservice companies have a strategic plan in place by 2030 with concrete steps to achieve climate neutrality for the beef value chain by 2040 for scopes 1, 2 and 3.



COW-CALF

Existing metric

Is a grazing management plan (or equivalent) being implemented to protect and/or improve the land resources, including succession/transition planning?

Sector target

385 million acres will be covered by a written grazing management plan by 2050.

AUCTION MARKET - N/A

FEEDYARD

Existing metric

Has a nutrient management strategy or plan been implemented?

Sector target

All feedyards are implementing nutrient management plans and practices by 2030.

PACKER & PROCESSOR

Existing metric

Does the company have initiatives and/or explore opportunities to mitigate land and biodiversity impacts from new facility developments?

Sector target

All facility construction, renovation or expansion projects will include a plan to mitigate impacts on natural resources by 2025.

RETAIL & FOODSERVICE

Existing metric

LEVEL 1

Has the company assessed the deforestation risk in its beef supply chain?

LEVEL 2

Is the retail/foodservice company working with organizations to support U.S. farmers and ranchers in developing and implementing grazing management plans?

Does the retailer have environmental and community engagement policies to mitigate land impacts from new site developments on greenfields over five acres?

Does the company have a no net deforestation policy for its beef?

Sector target

All USRSB member retail and foodservice companies have assessed conversion risk in their U.S. supply chain, set science-based goals and, by 2025, will implement a strategy to reduce conversion.

All USRSB member retail and foodservice companies are working with organizations to support U.S. farmers and ranchers (e.g., technical assistance, financial assistance, etc.) in developing and implementing grazing management plans on 385 million acres by 2050.



WATER RESOURCES

COW-CALF

Existing metric

Is a grazing management plan (or equivalent) being implemented that maintains or improves water resources?

Sector target

385 million acres covered by a written grazing management plan by 2050.

AUCTION MARKET

Existing metric

Are water resource management strategies implemented at the auction barn that address water management, water use optimization/conservation and water quality?

Sector target

All USRSB member organizations representing livestock markets that handle cattle have implemented a water management plan by 2030.

FEEDYARD

Existing metric

Are water resource management strategies implemented at the feedyard that address water management, water use optimization and conservation and water quality?

Sector target

All feedyards are assessing water availability and implementing water conservation management practices by 2030.

PACKER & PROCESSOR

Existing metric

LEVEL 1

Is a water resource management plan implemented at the facility?

LEVEL 2

How many wastewater permit non-compliances has the facility had in the previous calendar year?

What is the water use in gallons/head/day (packers) or gallons/pound of beef processed (processors)?

LEVEL 3

Does the company track discharge water quality over time?

Does the company have set goals for continued improvement?

Does the company make water performance efforts public?

Does the company participate in partnerships, initiatives or programs to further advance water resource management?

Sector target

All beef packers and processors have assessed water risk and impacts of their direct operations and assessed water risks in key sourcing regions by 2030; and

All beef packers and processors have implemented concrete steps (e.g., support technical or financial assistance, transparency efforts) to encourage adoption of the U.S. Beef Industry Sustainability Framework water metrics in the U.S. beef value chain by 2030.

RETAIL & FOODSERVICE

Existing metric

LEVEL 1

Has the company assessed the water risk of its operations and locations?

LEVEL 2

Does the company have a plan for water resource and risk management, including both quantity and quality impacts?

Has the company assessed the water risk of its direct beef suppliers?

Does the company engage suppliers and encourage adoption of USRSB water resource metrics in its beef value chain?

LEVEL 3

Is the company participating in a credible system for reporting water stewardship?

Has the company set water targets based on its assessments?

Can the company demonstrate progress towards these targets?

Does the company track performance on water stewardship in its beef value chain?

Sector target

All USRSB member retail and foodservice companies have assessed the water risk and impacts of both direct operations and of their beef suppliers by 2025 and are implementing improvement plans, tracking performance and publicly reporting progress of water stewardship across the company's sourcing footprint by 2030; and

All USRSB member retail and foodservice companies have implemented concrete steps (e.g., support technical or financial assistance, transparency efforts) to encourage adoption of the U.S. Beef Industry Sustainability Framework water metrics in the U.S. beef value chain by 2030.



EMPLOYEE SAFETY & WELL-BEING

COW-CALF

Existing metric

Are all individuals who are involved in the operation trained in stockmanship and safety and are they implementing these practices on the farm or ranch?

Sector target

10% year-over-year increase in individuals trained for stockmanship and safety.

AUCTION MARKET

Existing metric

Is an employee safety program in place?

Sector target

All livestock marketing businesses handling cattle represented by USRSB member organizations will have documented and implemented an employee safety plan by 2030.

FEEDYARD

Existing metric

Are feedyard employees trained and is an employee safety program implemented at the feedyard?

Sector target

All feedyard employees will be trained in relevant safety protocols by 2030.

PACKER & PROCESSOR

Existing metric

LEVEL 1

Does the company have a documented employee safety and well-being program that engages front-line employees and leadership?

LEVEL 2

Does the company track Total Recordable Incident Rates (TRIR)?

LEVEL 3

Does the company track trends on TRIR and reference rates against the NAICS industry standard rate to set goals for the upcoming year?

Does the company participate in partnerships, initiatives or programs to further advance employee safety and well-being?

Sector target

All companies have a robust employee safety program by 2023.
Sector reduction in TRIR by 50% by 2030.

RETAIL & FOODSERVICE

Existing metric

LEVEL 1

Does the company have clearly documented policies and procedures around employee workplace safety and training programs?

Does the company require training on food safety and handling techniques for beef?

LEVEL 2

Does the company have a supplier code of conduct (or equivalent) that includes employee health and safety policies and have a system for tracking compliance of its beef suppliers?

LEVEL 3

Does the company track the number of direct company employees (not value chain) completing safety and training programs?

Sector target

All USRSB member retail and foodservice companies have employee workplace and food safety training in place by 2023.

All USRSB member retail and foodservice companies have a public code of conduct (or equivalent) that includes employee health and safety policies and have a system for tracking compliance of their own operations and their U.S. beef suppliers by 2023.



ANIMAL HEALTH & WELL-BEING

COW-CALF

Existing metric

Has the operation adopted Beef Quality Assurance (BQA) or similar program principles into management of the farm or ranch?

Sector target

Increase the number of individuals trained and certified in BQA or equivalent by 10% year-over-year.

AUCTION MARKET

Existing metric

Are employees trained and auction-specific Beef Quality Assurance (BQA) principles being implemented at the auction market?

Sector target

All cattle handling employees of livestock marketing businesses represented by USRSB member organizations are trained through BQA or Livestock Marketing Association (LMA) by 2030.

FEEDYARD

Existing metric

Are feedyard employees trained in Beef Quality Assurance (BQA) principles and are these principles implemented at the feedyard?

Sector target

All feedyard employees in a livestock handling role are trained and certified in BQA principles by 2030.

PACKER & PROCESSOR

Existing metric

LEVEL 1

Packer: Does the company have a comprehensive animal welfare program including third-party verification?

Processor: Does the company have a documented animal welfare policy (or equivalent) and encourage the adoption of the U.S. Beef Industry Sustainability Framework's animal health and well-being metrics?

LEVEL 2

Packer: What was your company's total number of USDA non-compliance animal welfare violations per 100,000 head processed in the previous calendar year?

Packer: What percentage of cattle come under a third-party audit? What percentage pass on first audit?

Processor: Does the company use second-or-third party animal welfare audits, such as the North American Meat Institute's (NAMI) Animal Handling Guidelines and Audit Guide, to verify policy compliance to at least the packer level?

LEVEL 3

Does the company track animal health and well-being over time and set goals for continued improvement?

Does the company engage its suppliers or participate in partnerships, initiatives or programs and/or engage its suppliers to advance continuous improvement regarding animal health and well-being in the beef value chain?

Sector target

By 2025, all beef packers who handle animals will pass third-party animal transport and handling audits and all packers and processors will require all suppliers to implement mandatory employee training and follow BQA standards for animal care.

RETAIL & FOODSERVICE

Existing metric

LEVEL 1

Does the company have a documented and publicly available animal care and handling policy?

Does the company encourage the adoption of USRSB metrics in its beef value chain?

LEVEL 2

Does the company verify compliance with its policy at least to the packer level?

Does the company have a policy for audit failures?

LEVEL 3

Does the company engage its suppliers on continuous improvement and emerging issues regarding animal health and well-being in its beef supply chain?

Does the company track and assess progress on animal health and well-being outcomes that align with its policy?

Sector target

All USRSB member retail and foodservice companies have a publicly available animal care and well-being policy by 2023.

All USRSB member retail and foodservice companies have implemented concrete steps to encourage the adoption of U.S. Beef Industry Framework metrics and measuring progress against metrics by 2025.



EFFICIENCY & YIELD

COW-CALF

Existing metric

Is there a strategy implemented to optimize animal productivity through improved nutrition, reproduction, genetics, technologies and practices?

Sector target

Develop a cow-calf financial health index and set sector targets for improvement by 2025.

FEEDYARD

Existing metric

Are cattle performance and operational efficiency tracked over time for this facility?

Sector target

Continue to enhance cattle performance and feedyard efficiency.

PACKER & PROCESSOR

Existing metric

Level 1

Is a program to divert waste from landfills implemented at the facility?

Level 2

How much mass of waste/head or waste/mass of finished product does the company divert from landfill?

Level 3

Does the company track waste reduction over time and set goals for continued improvement?

Does the company participate in partnerships, initiatives or programs to further advance waste reduction strategies?

Sector target

All beef packers and processors are delivering on a public-facing food waste reduction goal by 2030.

By 2030, all beef packers and processors have implemented a zero waste to landfill diversion program and goal that is audited by an accredited third party to a published standard.

RETAIL & FOODSERVICE

Existing metric

Level 1

Has the company assessed food waste in its own operations?

Level 2

Does the company have programs focused on reducing food waste in its operations, including beef waste?

Does the company have policies that encourage adoption of the Framework's metrics and enable suppliers to find alternative uses for safe, wholesome surplus products (beef, in particular)?

Level 3

Does the company set targets and track performance of its food waste reduction programs, including beef?

Does the company engage its direct suppliers and track performance on food waste reduction in its beef value chain?

Sector target

All USRSB member retail and foodservice companies have assessed food waste and have set a target to reduce food waste by 2023 and are reporting progress publicly by 2025.

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AIR & GREENHOUSE GAS EMISSIONS

The U.S. beef supply chain will achieve climate neutrality by 2040.

AIR & GREENHOUSE GAS EMISSIONS CONTEXT

Shifts in global climate have the potential to threaten food production, impair livelihoods and food security and impact biodiversity. Beef production in the U.S. contributes to and is impacted by emissions of airborne pollutants such as dust and other particulates and greenhouse gases (GHGs), which can negatively impact air quality and climate stability. Improved practices and interventions throughout the value chain can also help reduce or mitigate the impacts of these pollutants. Therefore, each sector of the beef industry shares the responsibility for tackling this challenge in ways that will add up to industry-wide impact. Climate change, in particular, is causing disruptions and stressors to growing conditions and human well-being, and the beef industry is well positioned to make positive contributions to solving this urgent global problem through reduction of key GHGs, including methane, and storage/sequestration of carbon in soils.

Examples of the positive contributions sectors can make include:

- Cattle producers' management decisions and activities can directly impact the health of pastures and rangelands on which the cattle graze, which affects their ability to maintain vast carbon stocks, potentially capture and store additional carbon and deliver co-benefits for water resources, wildlife and forage production.
- The implementation of emerging technologies (e.g., feed additives) and management practices can lower the resource consumption and GHG emissions from cattle feeding and beef processing.
- Retailers and foodservice providers can identify GHG emissions in their own operations, particularly from energy use, water use, coolant leakage and food waste and find cost-effective means to reduce these GHG emissions.

USRSB air & greenhouse gas emissions definition

The cumulative emissions of pollutants, including particulate matter, greenhouse gases, and other gaseous emissions from a sector for each process (U.S. Beef Industry Sustainability Framework, 2019).

The USRSB recognizes both the need to make further improvements that build upon the past track record the industry has of reducing GHG emissions per pound of beef produced (e.g., an approximate 16% reduction in emissions intensity from 1977 to 2007; Capper, 2011) and maintain the significant soil carbon stocks that are stewarded by the men and women that raise cattle. For example, it is estimated that grasslands in the U.S. store approximately 5,090 Tg of carbon within their soils alone and another 1,300 in the above- and below-ground biomass of plants (Pendall et al., 2018). Additionally, the USRSB acknowledges that to achieve the goal of climate neutrality by 2040, emissions will not only need to be reduced per pound of beef consumed, but also the absolute or total net emissions (emissions + carbon sequestration) from the industry will need to be reduced from current levels.

Why this goal?

This goal statement reflects the recognition by the U.S. beef industry that the activities associated with beef production are both impacted by and contribute to GHG emissions in the short- and long-term. It underscores the full industry's commitment to produce more with less and contribute to a future that stays within 2 degrees or ideally 1.5 degrees Celsius of global average temperature increase relative to pre-industrial times. This goal statement also reflects these assumptions:

1. There is good baseline information about the U.S. beef industry's contribution.
2. The need to reduce the industry's emissions is also well documented.



3. Many specific means for reducing emissions are also well established.
4. New innovations and strategies will be required over the next two decades to build upon established mitigation strategies.
5. Adequate information exists to develop specific timebound goals for GHG emissions.
6. More systematic national approaches to support action and achievement are needed.
7. New programs will be developed to support strategies and provide resources for deploying tools and practices at needed scales, particularly to overcome economic tradeoffs and create economic opportunities through emissions reductions.
8. New sources of data will become available (or be generated by the industry) to fill known data gaps, including information on the net impact that may be achieved by “stacking” practices across the supply chain.
9. Currently available emissions data sources will remain available in the future.

What does “climate neutrality” mean? Is “climate neutral” the same as “carbon neutral”?

The terminology regarding climate impacts can be subtle; however, the distinction between terms such as “climate neutral” or “carbon neutral” is important, especially within the context of the USRSB’s goal. To clarify, the following discussion outlines how the USRSB is distinguishing between climate impact terminology.

The United Nations Intergovernmental Panel on Climate Change (IPCC) defines carbon neutral as the condition in which anthropogenic (i.e., human-made) carbon dioxide (CO₂) emissions associated with a subject are balanced by anthropogenic CO₂ removals (IPCC, 2021). The subject can be an entity such as a country, an organization, a district, a commodity or an activity such as a service or an event. Carbon neutrality is often assessed over the subject’s life cycle, including indirect (i.e., “scope 3”) emissions, but can also be assessed as emissions and removals over a specified period for which the subject has direct control, as determined by the relevant scheme.

Net zero CO₂ emissions are defined by the IPCC (2021) as the condition in which anthropogenic CO₂ emissions are balanced by anthropogenic CO₂ removals over a specified period. At a global scale, carbon neutrality and net zero CO₂ emissions are equivalent. At sub-global scales, net zero CO₂ emission calculations are generally applied to emissions and removals under direct control or territorial responsibility of the reporting entity, while carbon neutrality generally includes emissions and removals within and beyond the direct control or territorial responsibility of the reporting entity (e.g., life cycle emissions).

Net zero GHG emissions are defined as by the IPCC (2021) as the condition in which metric-weighted anthropogenic GHG emissions associated with a subject are balanced by metric-weighted anthropogenic GHG removals. The subject can be an entity such as a country, an organization, a district, a commodity or an activity such as a service or an event. Greenhouse gas neutrality is often assessed over the life cycle including indirect (i.e., “scope 3”) emissions but can also be limited to the emissions and removals, over a specified period for which the subject has direct control, as determined by the relevant scheme. The quantification of GHG

emissions and removals depends on the GHG emission metric chosen to compare emissions and removals of different gases, as well as the time horizon chosen for that metric.

Climate neutrality is not formally defined by the IPCC; however, in common usage it can be viewed as equivalent to achieving no additional climate impact from activities by an entity at the regional, sub-national or national scale (Pineda and Faria, 2019). Climate neutrality can be viewed as equivalent to net zero warming and can be characterized by achieving and maintaining net emissions at zero CO₂ warming equivalents.

Net zero warming is not formally defined by the IPCC; however, it has been described by Cain et al. (2019) as net zero (emissions plus removals) CO₂ warming equivalent emissions as calculated using global warming potential star (GWP*) for short-lived climate pollutants such as CH₄ and 100-year global warming potentials (GWP100) for long-lived climate pollutants, such as nitrous oxide (N₂O). Net zero warming implies activities from an entity at the regional, sub-national or national scale would not lead to additional warming and could be defined by reaching and maintaining net zero CO₂ warming equivalent emission.

What about air emissions other than greenhouse gas emissions?

The USRSB air and greenhouse gas emissions indicator is an all-encompassing category that includes other air emissions of concern, such as particulate matter and ammonia gas emissions. While the overall goal and sector targets are focused on climate impacts and mitigation of GHG emissions, this is not a reflection that other emissions are unimportant nor that the industry will not work to mitigate those other emissions of concern. Indeed, progress in other metrics, such as water resources, land resources and efficiency and yield, will help to advance progress in mitigating other air emissions such as reactive nitrogen (N) emissions.

What are the practices and technologies that the U.S. beef value chain can employ to achieve climate neutrality?

Substantial scientific assessments of the impacts of different tools and practices on GHG emissions from the U.S. beef supply chain are complete or currently underway. For example, The Nature Conservancy’s “A Roadmap to a Sustainable Beef System” provides one such basic outline of potential actions that can be implemented by each sector to reduce emissions (TNC, 2021). Additionally, the UC Davis CLEAR Center has recently published a white paper outlining the emissions reductions required to achieve climate neutrality for U.S. beef and dairy cattle production (Place and Mitloehner, 2021).

The general conclusion from these assessments and others is that the U.S. beef industry can make significant, positive contributions to global air and GHG goals through reductions in both short- (e.g., methane) and long-lived (e.g., carbon dioxide and nitrous oxide) climate pollutants. These contributions are possible if existing and emerging tools and technologies are widely adopted and rigorously applied across the beef supply chain. Although the specific, quantitative reductions achievable through a specific practice or set of practices are not currently available in a single, consolidated data set, relevant tools and



AIR & GREENHOUSE GAS EMISSIONS

practices for each sector are listed in the following section (Tools and practices to improve outcomes by sector). It is important to note that this is not a comprehensive list of all potential practices that may be relevant for every operation within the U.S. beef supply chain. For example, improvements in crop production to lower GHG emissions will greatly benefit the overall climate impact of the U.S. beef industry but are not included here. Instead, this list represents major opportunities that are consistently identified by industry experts and stakeholders.

TOOLS AND PRACTICES TO IMPROVE OUTCOMES BY SECTOR

Cow-calf	
ASSESSED TOOLS AND PRACTICES	NEAR-TERM (AVAILABLE NOW TO 5 YEARS) OR LONGER-TERM (5+ YEARS)
Grazing management plans and prescribed grazing	Near-term
Ecological restoration (e.g., range planting, condition improvement, riparian/wetland restoration)	Near-term
Avoided conversion / maintaining extent of grazing lands	Near-term
Feed additives / supplemental nutrition to reduce enteric methane production and improve feed conversion efficiency	Near- and longer-term
Vaccines to alter rumen microbial community and reduce enteric methane production	Longer-term
Animal health and well-being / performance improvements (e.g., preconditioning, reproduction, genetics, other management)	Near-term
Development and implementation of genetic selection for low methane emitting cattle (e.g., methane production becomes an economically relevant trait and is incorporated into selection indices)	Longer-term
Auction market & feedyard	
ASSESSED TOOLS AND PRACTICES	NEAR-TERM (AVAILABLE NOW TO 5 YEARS) OR LONGER-TERM (5+ YEARS)
Feed additives / supplemental nutrition to reduce enteric methane production and improve feed conversion efficiency	Near- and longer-term
Vaccines to alter rumen microbial community and reduce enteric methane production	Longer-term
Feed composition (ratios and supplements designed to reduce fermentation, improve feed digestibility, reduce finishing time)	Near-term
Manure management (e.g., digesters, separators, composters, covers) and re-use, where relevant for climate, housing and management system	Near- and longer-term
Installation of green infrastructure	Near-term
Technology applications (e.g., sorting, early diagnostics)	Near-term
Animal health and well-being / performance improvements (e.g., preconditioning, reproduction, genetics, other management)	Near-term
Packer & processor	
ASSESSED TOOLS AND PRACTICES	NEAR-TERM (AVAILABLE NOW TO 5 YEARS) OR LONGER-TERM (5+ YEARS)
Use of renewable energy and energy efficiency upgrades	Near- and longer-term
Waste reduction and diversion in processing operations (i.e., enhanced efficiency and yield)	Near-term
Adoption of low or zero carbon transportation fleets	Longer-term
Retail & foodservice	
ASSESSED TOOLS AND PRACTICES	NEAR-TERM (AVAILABLE NOW TO 5 YEARS) OR LONGER-TERM (5+ YEARS)
Use of renewable energy and energy efficiency upgrades	Near- and longer-term
Waste reduction and diversion in facility operations (i.e., packaging, enhanced efficiency and yield in food preparation)	Near-term
Adoption of low or zero carbon transportation fleets	Longer-term



AIR & GREENHOUSE GAS EMISSIONS

How will we measure progress towards this goal?

The primary data source that has been used to establish the historical and current conditions of the air and greenhouse gas emissions indicator is the U.S.-wide industry lifecycle assessment (LCA) prepared by Thoma et al. (in prep). There are four impact categories included in the Thoma et al. LCA that are relevant to the USRSB air and greenhouse gas emissions indicator goal: climate change, particulate matter, ozone formation potential and ozone depletion potential. These measures have implications for both GHG emissions and a broader set of air-related concerns, though the focus of the discussion to date has centered largely on the former concern.

The methods used to characterize GHG emissions in the LCA rely on a variety of data, some of which is made regularly available by the USDA through the Agricultural Resource Management Survey (ARMS), Quick Stats and Economic Research Service (ERS) portals. These data are used, currently, with the Integrated Farm System Model (Rotz et al., 2015) which has been developed to simulate beef and dairy production systems, specifically including estimates of enteric methane and manure methane emissions, as well as field emissions associated with crop production.

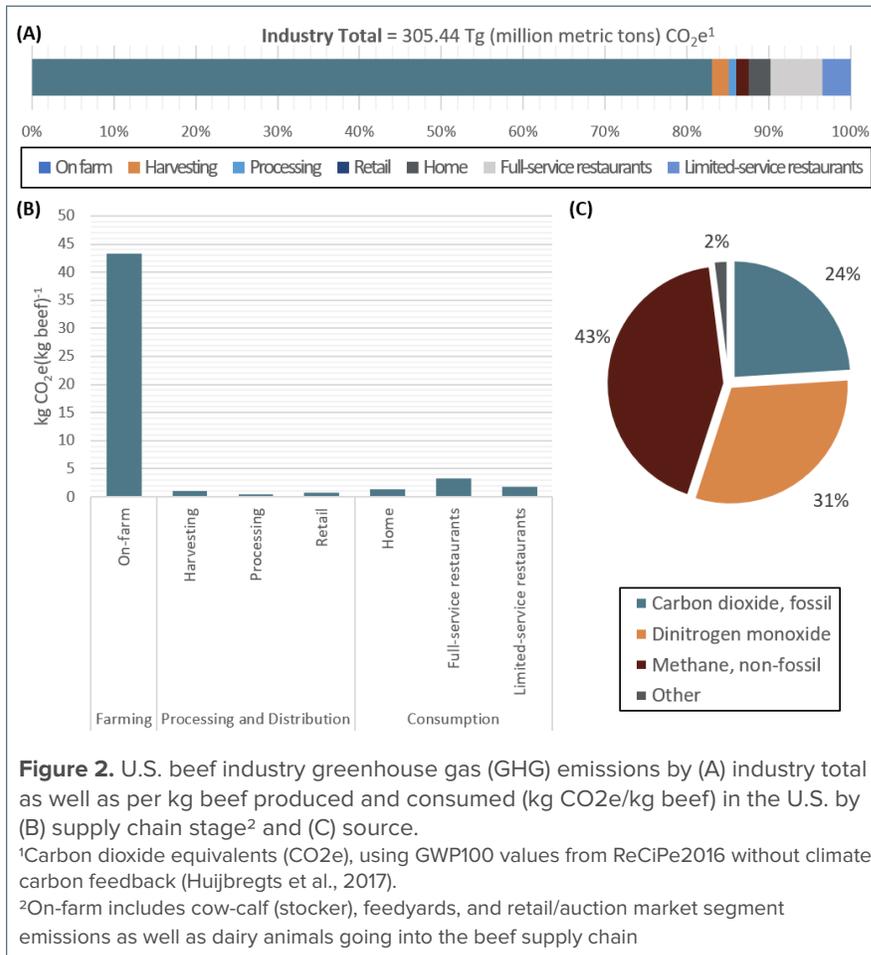
These estimates consider region-specific industry practices and impacts in the cow-calf, stocker/backgrounder and finishing stages of production across seven U.S. regions (i.e., the Northwest, Southwest, Northern Plains, Southern Plains, Midwest, Northeast, Southeast), following Rotz et al. (2019). Estimates of animal populations across each of the production stages in each of the seven regions were developed using survey data in National Agricultural Statistics Service statistics. The data from the region-specific surveys were also the basis of the creation of archetypical descriptions of production practices for each region. Estimated animal numbers managed using each described practice were used as inputs to a process-based simulation tool, known as the Integrated Farm System Model. Finally, regional simulations were aggregated to generate a national-scale estimate for each of the indicator impact categories.

This LCA offers a rigorous and robust assessment and is the only LCA specific to the U.S. beef industry. Furthermore, using this data source enables consistency across indicators, as we also use the LCA findings to inform the industry-wide indicator baselines for water resources and land resources.

Figure 2 highlights the findings from the LCA in terms of what portion of U.S. beef's carbon footprint occurs within different supply chain segments and the breakdown of total emissions by gas.

What are Scope 1, 2 and 3 emissions?

Within this document and within specific sector targets, reference is made to scope 1, 2 and 3 emissions sources. This terminology is an emissions source classification system that is a standard of corporate greenhouse gas emissions reporting.



Scope 1 emissions refer to emissions that come directly from an operation and are under that operation's control. Examples may be the enteric methane from a feedyard operation or emissions from fuel combusted on-site to heat a restaurant.

Scope 2 emissions refer to indirect emissions from the purchase of energy (e.g., electricity, steam, heat or cooling). For the example feedyard or restaurant, emissions associated with generating purchased electricity (e.g., emissions from a coal-fired power plant) would be considered Scope 2 emissions sources.

Scope 3 emissions are indirect emissions and are the result of activities from assets not owned or controlled by the reporting organization but that the organization indirectly impacts in its value chain. Scope 3 emissions typically represent the bulk of any operation's emissions inventory. For the example feedyard, scope 3 emissions would include the impacts of raising calves bound for the feedyard for finishing and the impacts of growing purchased feedstuffs. For a restaurant, scope 3 emissions would include the emissions associated with producing all consumables, from paper to beef purchases. Thus, the feedyard's scope 1, 2 and 3 emissions are all part of the restaurant's scope 3 emissions profile (U.S. EPA, 2021). The all-encompassing nature of scope 3 emissions means as individual sectors with the U.S. beef value chain improve and reduce their emissions, subsequent sectors in the value chain benefit from the reductions in their scope 3 emissions inventories.



SECTOR LEVEL METRICS AND TARGETS

Sector-level metrics and targets for air and greenhouse gas emissions can be found in the tables below. As with the overall goal, there is an emphasis on mitigating greenhouse gas emissions; however, that is not indicative that the industry will not also work to reduce other air emissions such as dust and ammonia gas emissions. Indeed, overall progress on the suite of the six USRSB high-priority indicators should have co-benefits of reducing other air quality emissions.

More information about the metrics, which are relevant to achieving sector targets can be found in the sustainability assessment guides of the U.S. Beef Industry Sustainability Framework document.

COW-CALF

Existing metric

Has a grazing management plan (or equivalent) been implemented that protects or improves soil and plant community health, including soil carbon sequestration?

Sector target

385 million acres covered by a written grazing management plan by 2050.

FEEDYARD

Existing metric

Are strategies in place to manage air and greenhouse gas (GHG) emissions?

Sector target

The feedyard sector will reduce greenhouse gas emissions by 10% per pound of beef by 2030.

PACKER & PROCESSOR

Existing metric

LEVEL 1

Are strategies in place to optimize energy efficiency and reduce GHG emissions at company facility(ies)?

LEVEL 2

What is the company's carbon dioxide equivalents (CO₂e) per head or CO₂e per mass of finished product?

LEVEL 3

Does the company make CO₂e publicly available?

Does the company track air and GHG emissions over time and set goals for continued improvement?

Does the company participate in partnerships, initiatives or programs to further GHG reduction and improve air quality?

Sector target

90% of beef processed in the U.S. comes from companies with a GHG reduction strategy, are reporting against that strategy by 2025 and are delivering on their GHG reduction goal by 2030.

By 2030, all beef packers and processors will be taking tangible action to achieve an approved science-based target to reduce emissions in line with limiting global temperature increases to well below 2 or, ideally, 1.5 degrees Celsius relative to pre-industrial levels.

RETAIL & FOODSERVICE

Existing metric

LEVEL 1

Has the company assessed its scope 1 and 2 GHG emissions?

LEVEL 2

Does the company have a plan to reduce its scope 1 and 2 GHG emissions?

Has the company assessed the scope 3 GHG emissions of its beef value chain?

Does the company engage suppliers and encourage adoption of USRSB air and GHG metrics in its beef value chain?

LEVEL 3

Is the company participating in a credible external system reporting for GHG emissions?

Has the company set credible GHG emissions targets?

Can the company demonstrate progress towards these targets?

Sector target

All USRSB member retail and foodservice companies have set credible GHG reduction goals to reduce scope 1 and 2 emissions by 2023;

All USRSB member retail and foodservice companies have set credible GHG reduction goals for their company to reduce scope 3 emissions and are publicly reporting progress by 2030; and

All USRSB member retail and foodservice companies have a strategic plan in place by 2030 with concrete steps to achieve climate neutrality for the beef value chain by 2040 for scopes 1, 2 and 3.



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LAND RESOURCES GOAL

The U.S. beef supply chain will work to maintain and improve grazing lands under the care of U.S. beef producers. We will do this by:

- Establishing a baseline for acres under grazing management plans (GMPs) by 2023;
- Achieving 385 million acres covered by a written GMP by 2050; and
- Supporting programs that respect property rights, create value and expand producer capacity to deploy well-managed grazing strategies to ensure lasting legacies founded on conservation and economic success.

LAND RESOURCES CONTEXT

Temperate grasslands, like those in the U.S., are one of the most at-risk major terrestrial ecosystems on Earth (Hoekstra et al. 2005). North American native prairies have suffered dramatic declines from land-use change, degradation, woody encroachment and the expansion of invasive species (Ahlering et al., 2020). Today, it is estimated that less than 4% of the tallgrass prairie that existed at the time of initial European contact remains intact (National Park Service, 2020). The conversion of these prairies has led to the loss of large volumes of soil and soil carbon, erosion, water quality degradation and the loss of billions of birds and large numbers of other wildlife species.

The incursion of invasive annual grasses, lasting drought, land degradation and the growing threat of wildfire is creating similar challenges on many of the rangelands that lie between the Pacific Ocean to the west and the Rocky Mountains to the east. Further losses will exacerbate the challenges we are facing with climate, wildlife and water sustainability, as well as the resilience of ranching operations and the economic viability of farmers and ranchers and their communities.

These historic losses of grazing lands described above only make the conservation of the U.S.'s remaining grazing lands more important. Grazing lands today are critical to the conservation of myriad species of plants and animals. They provide clean water essential to the needs of both people and nature. Relative to climate change, grazing lands store vast volumes of carbon, much of which would be released to the atmosphere if the

USRSB land resources definition

The stewardship of terrestrial and aquatic habitats in relation to water, soil and biodiversity. Impacts of land use and land use conversion, both caused by and prevented by ranching and farming activities and other supply chain land use decisions (U.S. Beef Industry Sustainability Framework, 2019).

lands are converted to other intensive uses. Finally, these lands simultaneously provide food for people and livelihoods to the hundreds of thousands of people who raise cattle and other livestock. In many ways, the economic value conferred on grazing lands by virtue of their responsible use as grazing resources plays a key role in conserving them.

As such, well-managed grazing lands and the people that steward them are a critical part of the solution to many of the social and ecological challenges today. Grazing is an important ecological process in North American grasslands (Bragg, 1995), and many opportunities exist to promote ranching and wildlife (Gennet et al. 2017) as well as to ensure the protection of soil carbon (Ahlering et al., 2016). For example, management actions that restore soils and soil carbon in degraded grasslands could help mitigate climate change (Conant & Paustian, 2002), particularly when restored to high levels of plant diversity (Yang et al., 2019). Furthermore, adaptive management approaches can increase resilience to drought, having positive impacts both for grassland biodiversity and the ranchers who rely on them for forage production (Derner et al. 2016).



Why grazing management plans?

Optimizing land resources requires the consideration of many factors, including soil type, climate, vegetative cover, wildlife and their habitat, soil ecological function, cattle health requirements, invasive species (including plants) and many others. The most useful tool for cattle producers to manage all of these factors to maintain and improve land resources is a grazing management plan (GMP). GMPs are also powerful tools for helping producers adapt management plans and actions to mitigate risks like drought, wildfire, market fluctuations and accidents where the outcomes are positive for the land and allow the operation to maintain economic viability. Well-conceived and well-implemented GMPs can provide the benefits outlined above for land resources while also delivering co-benefits for the water resources, air and greenhouse gas emissions indicators and the overall performance of the grazing operation.

A range of improvements in land resource sustainability outcomes can be attained through GMPs including:

- Creation of optimum conditions for plant regrowth that proper grazing management supports
- Maintained healthy root systems and an associated healthy microbiology of the soil
- Healthy ecosystems and ecological processes, which
 - Increase resilience to climate, invasive species, wildfire and other stresses
 - Promote biological diversity and productive wildlife habitat
 - Increase carrying capacity of the grassland for livestock and wildlife over time

Many of the same practices that improve forage production have been shown to protect the supply and quality of the water and the integrity of riparian areas. Maintaining healthy pastures and grasslands has important benefits for water quality and quantity. Grazing refines and maintains this ecological service, both ecologically and economically.

What is the extent of grazing lands managed by cattle farmers and ranchers in the United States?

We have estimates for land use from the forthcoming U.S.-wide beef industry LCA (Thoma et al., in prep-a). From this data, it is estimated that the U.S. beef supply chain currently has a land use impact of ~623 million acres, the majority of which is in pastureland and/or hay production. This forthcoming LCA offers the best currently available assessment of land resource use that is specific to the U.S. beef industry (other sources are not as specific to the beef industry). Using this data source also enables consistency across indicators (we also use the LCA findings to inform baseline industry-wide greenhouse gas and water impacts related to the air & greenhouse gas emissions and water resources indicators).

Land use impact estimates in Thoma et al. (in prep-a) take into account region-specific industry practices and impacts in the cow-calf and stocker/backgrounder stages of production across seven U.S. regions (i.e., the Northwest, Southwest, Northern Plains, Southern Plains, Midwest, Northeast and Southeast), following the methods of Rotz et al. (2019). Estimates of animal populations across each of the production stages within the

seven regions were developed using National Agricultural Statistics Service (NASS) survey data. The region-specific surveys were also used to create archetypical descriptions of production practices and estimate animal numbers managed by each practice. These data were then used as inputs to a process-based simulation tool, specifically, the Integrated Farm System Model (Rotz et al., 2015), which is a well-established methodology for completing LCAs. The simulations resulting from this tool were then combined to generate a national-scale estimate for each of the indicator categories.

Using Rotz et al., 2019 national feed resource use estimates, harvested forage and grain production acres were estimated to subtract from the total land use estimate (623 million acres) to determine grazing land acres use for beef cattle production. Approximately 8 million acres of grain production and 32 million acres of harvested forage support US beef cattle production. Consequently, we estimate that US cattle farmers and ranchers manage 583 million acres of grazing lands (both public and private) in the United States. This estimate is larger than the estimated 460 million acres of grazing lands used by beef cattle from Maher et al., (2021); however, Maher et al. (2021) only accounts for grazing lands for farms and ranches that receive the majority of their income from beef cattle farming and ranching (North American Classification System; NAICS code 112111). Consequently, Maher et al. (2021) is an underestimate of total grazing land acres used for beef cattle production. Our goal is to achieve two thirds of those lands under written grazing management plans by 2050, or 385 million acres. Proposed progress towards the 2050 goal is shown in Table 1.

Table 1. Proposed progress, in 5-year increments, towards land covered under grazing management plans based on relative percentage of estimated total land uses for grazing.

YEAR	Land under grazing management plans (million acres)	Percent of total land use estimate (%)
2025	58	10
2030	146	25
2035	204	35
2040	292	50
2045	335	58
2050	385	66

How many acres are currently managed under a written grazing management plan?

Current estimates of the number of grazing lands managed under a written GMP are incomplete. Consequently, USRSB will work with partners to establish a baseline of current acres, both public and private, that are grazed by cattle and managed under a grazing management plan.



How will we measure progress and achieve our goal?

The USRSB will work in the coming year to establish a baseline of the current extent of written GMPs by working with partners and set a schedule of benchmarking progress towards our 2050 goal. USRSB also intends to further our understanding of how progress towards adoption of written GMPs that are site- and goal-specific to cattle farm and ranch land managers links to positive ecological outcomes, such as wildlife habitat and water retention and infiltration. Current resources that will support USRSB in measuring land extent and land condition of U.S. grazing lands are listed in Table 2. The USRSB will adapt to newer datasets and resources as they become available in the coming years.

To support the adoption of written GMPs, the USRSB will partner with relevant partners, such as university extension programs, that provide technical support services to cattle farm and ranchers and land managers.

Table 2. Resources available to track land use extent and land conditions

Resource/description	Relevance	Data characteristics & other notes
The Nature Conservancy's resilient lands map	Lands of high conservation priority	Assessment of resilient landscapes across the U.S. using the definition: "area of land where high microclimatic diversity and low levels of human modification provide species with connected, diverse climatic conditions they will need to persist and adapt to changing regional climates" <ul style="list-style-type: none"> Granularity: Medium/high Source Type: NGO
Herrick et al. 2010	Land condition	Land condition assessments from 10,000 NRI plots and local knowledge <ul style="list-style-type: none"> Source Type: Academic/peer-reviewed
NASS Land Use and Land Cover data	Land use extent	Provides acre estimates by land use type and can be used to determine the current extent of permanent pasture/range and cropland in the US. <ul style="list-style-type: none"> Granularity: Low Source Type: Public/USDA
CropScape Cropland data layer	Land use extent	Datasets covering approximately 150 cultivated and natural production systems. <ul style="list-style-type: none"> Granularity: High Source Type: Public/USDA
NASS Land Use and Land Cover data	Land condition	Provides state averages of ranked pastureland condition (e.g., very poor to excellent), related to forage production surveyed weekly (available for current year, past year, or 5-year average). <ul style="list-style-type: none"> Granularity: Low Source Type: Public/USDA
Rangeland Analysis Platform	Land condition	Provides a time series of estimates of amount and type of plant cover. <ul style="list-style-type: none"> Granularity: Medium/high Source Type: Academic/public
Asem-Hiablie et al. 2019 data (Supplementary material)	Land use extent	Reports survey data from multiple peer-reviewed publications of land use estimates. <ul style="list-style-type: none"> Source Type: Academic/peer-reviewed
The Nature Conservancy's Ecosystem Services Identification & Inventory (ESII) Tool	Land condition	Tool that can be used to identify and quantify benefits to nature in site development, with an aim to aid in focusing natural/green infrastructure and restoration efforts. <ul style="list-style-type: none"> Granularity: Varied Source Type: NGO
Global Safety Net	Lands of high conservation priority	Global analysis of terrestrial areas essential for biodiversity and climate resilience. <ul style="list-style-type: none"> Granularity: Low/medium Source Type: NGO/public
Thoma et al. <i>in prep. -a and -b</i>	Land use extent and land condition	Estimates of Land Use from the forthcoming U.S.-wide industry LCA and analysis of biodiversity and ecosystem services in the U.S. beef sector. <ul style="list-style-type: none"> Granularity: Low/medium Source Type: Academic/peer-reviewed



How will progress towards the land resources goal improve outcomes?

Based on an assessment of available data and the resources in the USRSB Beef Industry Framework sustainability assessment guides, there are four primary levers for demonstrating progress on the land resources goal:

- Proper planning and citing of land development activities at all stages of the beef supply chain, including adherence to relevant regulatory or certification programs for mitigating or avoiding conversion
- Implementing improved land management practices while respecting property rights, creating value and building lasting legacies founded on conservation and economic success
- Implementing restoration activities where possible/appropriate
- Supporting and engaging market-based tools that incentivize improved management practices, increased forage cover, and improved biodiversity (e.g., ecosystem services markets), increasing their chance of free-market success.

All four of these levers can be directly controlled by individual entities in relevant sectors of the beef industry and/or indirectly influenced through supply chain collaborations.

The USRSB's work to advance education in the U.S. beef supply chain and communicate progress toward goals will enable uptake of these and related tools and practices and expand recognition of beef's value in providing food, conserving nature and sustaining livelihoods. Supporting expanded use of existing tools and practices like those described here, and the development of new or improved tools and practices, will likely benefit from collaboration among sectors to improve the enabling conditions for their use in the U.S. beef supply chain.

TOOLS AND PRACTICES TO IMPROVE OUTCOMES BY SECTOR

While grazing management plans are the focus of the goal, progress can be made to improve land resources under the care of the U.S. beef supply chain in a variety of ways (Table 3).

Table 3. Examples of tools and practices that can be used by the U.S. beef value chain to maintain current quality land management (land extent) and improve the land condition of acres managed (land condition).

Examples of tools and practices	Land extent	Land condition
COW-CALF		
Grazing management plans	X	X
Ecosystem service markets	X	X
Ranch management and assessment tools	X	X
Succession plans	X	
Conservation easements	X	X
AUCTION MARKET & FEEDYARD		
Nutrient management BMPs: <ul style="list-style-type: none"> • Manure management • Tillage strategies • Fertilizer and pesticide applications • Irrigation efficiency (where appropriate in the context of the water basin) • Edge of field practices 		X
On-site habitat restoration or installation of green infrastructure		X
PACKER & PROCESSOR		
Mitigation implemented for new facilities	X	X
On-site habitat restoration or installation of green infrastructure		X
RETAIL & FOOD SERVICE		
Conversion risk assessments	X	
Concrete actions to increase GMPs	X	X
On-site habitat restoration or installation of green infrastructure		X



LAND RESOURCES SECTOR TARGETS

Sector targets have been developed to support the USRSB beef industry goals. Recognizing that continuous improvement is about better outcomes, the USRSB seeks to develop goals and targets that will help improve performance by the industry as a whole as the net result of actions and achievements in each supply chain sector.

More information about the metrics, which are relevant to achieving sector targets, can be found in the sustainability assessment guides of the U.S. Beef Industry Sustainability Framework document.

COW-CALF

Existing metrics

Is a grazing management plan (or equivalent) being implemented to protect and/or improve the land resources, including succession/transition planning?

Sector targets

385 million acres will be covered by a written grazing management plan by 2050.

AUCTION MARKET – N/A

FEEDYARD

Existing metrics

Has a nutrient management strategy or plan been implemented?

Sector targets

All feedyards are implementing nutrient management plans and practices by 2030.

PACKER & PROCESSOR

Existing metrics

Does the company have initiatives and/or explore opportunities to mitigate land and biodiversity impacts from new facility developments?

Sector targets

All facility construction, renovation or expansion projects will include a plan to mitigate impacts on natural resources by 2025.

RETAIL & FOODSERVICE

Existing metrics

LEVEL 1

Has the company assessed the deforestation risk in its beef supply chain?

LEVEL 2

Is the retail/foodservice company working with organizations to support U.S. farmers and ranchers in developing and implementing grazing management plans?

Does the retailer have environmental and community engagement policies to mitigate land impacts from new site developments on greenfields over five acres?

Does the company have a no net deforestation policy for its beef?

Sector targets

All USRSB member retail and foodservice companies have assessed conversion risk in their U.S. supply chain, set science-based goals and, by 2025, will implement a strategy to reduce conversion.

All USRSB member retail and foodservice companies are working with organizations to support U.S. farmers and ranchers (e.g., technical assistance, financial assistance, etc.) in developing and implementing grazing management plans on 385 million acres by 2050.



Assumptions of our land resources goal

The land resources goal reflects the recognition by the U.S. beef industry that the extent and condition of grazing lands are critical to a viable beef production system and the provision of vital ecosystem services, including wildlife habitat. A key component of this goal will be equipping landowners and managers with skills and resources needed to improve conditions and perpetuate cattle production through conservation and economic success.

The goal statement also reflects these assumptions:

1. The need to both maintain the extent of grazing lands and maintain or improve their condition is well documented.
2. There is good baseline information about the extent of grazing lands in the U.S.
3. The current condition of grazing lands is well understood regionally but not in a consistent way nationally.
4. Locally relevant tools and practices for maintaining extent and improving conditions are well established.
5. Clear strategies and resources for deploying the practices at the needed scale are not yet established.
6. Available data are adequate for the USRSB to develop goals for land use extent and land condition, but more systematic national approaches to tracking extent and condition and from the development of supply chain strategies to support action and achievement are needed.
7. Contributions towards outcomes aligned with this goal statement will vary by sector. The U.S. beef industry is characterized by significant variability related to several factors, including but not limited to: production density, operation size, geographic location, climate, local regulatory approaches, culture/custom, etc. The resources in the SAGs reflect this variability.

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WATER RESOURCES GOAL

By 2050, the U.S. beef supply chain will improve water management strategies and improve water quality. We will do this by:

- Benchmarking water use and quality by 2025;
- Improving retention and capture of nutrients for beneficial use; and
- Supporting feedstuffs growers to achieve their water sustainability goals

WATER RESOURCES CONTEXT

Water is a critical resource, necessary for both people and nature to survive and thrive. Water scarcity and deteriorating water quality in many parts of the U.S. can affect the ability of the beef industry to meet the needs of consumers and support the communities in which it operates. Increased frequency and severity of droughts are not only a direct threat to the production potential of both grazing and croplands (Ge et al., 2016), but also increase the risk of devastating wildfires in much of the western U.S. (Scasta et al., 2016). Balancing the available supply of renewable water resources and the demand of those resources is the only way to reduce these risks and ensure the availability of water resources for all uses into the future. Additionally, grazing management, manure management, agronomic practices in feed production and waste and stormwater management can all have direct impacts on water quality of nearby ground and surface waters (Agouridis et al., 2005; Chi et al., 2020).

As with other indicators, well-managed grazing lands and judicious management of water and nutrients throughout the supply chain can also be part of the solution. Restoring degraded lands and soils can reduce erosion and improve water movement through the environment, keeping harmful sediment, excess nutrients and toxic compounds from entering water bodies. Streambank protection and riparian restoration in grazing lands have also been shown to reduce the concentrations of nutrients like phosphorus and bacteria in surface waters (Meals, 2001). Finally, implementing adaptive management in grazing lands not

USRSB water resources definition

The volume of water used by a sector for each process, and any impacts on water quality by a sector for each process (U.S. Beef Industry Sustainability Framework, 2019).

only increases resilience to drought, but can also contribute to other USRSB indicator goals, having positive results for both grassland biodiversity and the ranchers who rely on grasslands for forage production (Dermer et al. 2016).

Why is the goal about benchmarking?

The U.S. beef industry has national and regional information available on blue water use for beef cattle production (Rotz et al., 2019), and information is available on blue water use inclusive of the post-live cattle portions of the supply chain as well (Thoma et al. in prep). However, work remains to link water use to risk and stress and assess water quality impacts in regionally relevant ways. As water use and quality challenges are much more localized environmental issues as compared to greenhouse gas emissions for example, regionalization will be a critical part of the benchmarking process that will be completed by 2025. This process will also help prioritize hot spots for future actions.



What does “improving retention and capture of nutrients for beneficial use” mean?

Nutrients such as nitrogen and phosphorus in animal feed and manure are critical components of the agricultural system. They are essential for life processes of microbes, plants and animals alike. Improving retention and capture of these nutrients refers to the efficient nutrient cycling and minimization of nutrient losses (e.g., through runoff, volatilization and leaching). Nutrient losses can cause negative impacts on groundwater and surface waters (CAST, 2019). Practices that lead to the outcomes of improved nutrient retention and reduced losses are diverse and can vary by industry segment, climate and management facilities.

For example, in cow-calf or stocker cattle production, a grazing management plan that includes a strategy to adaptively manage for proper stocking rate given the resources available can potentially minimize severe overgrazing conditions which can decrease water infiltration and lead to increased nutrient runoff. In an auction market facility, proper facility design to capture runoff water from corrals and manure storage areas can prevent losses of manure nutrients to surface and ground waters. Further detailed examples of water resource management to minimize nutrient losses by sector can be found in the U.S. Beef Industry Sustainability Framework.

What does “supporting feedstuffs growers” mean?

The U.S. Beef Industry Framework does not directly incorporate metrics related to the growing of purchased row-crop feedstuffs used within the cattle industry; however, the USRSB does have a letter of agreement with Field-to-Market (FtM) to advance the sustainability of grains and other feedstuffs grown that are fed to cattle. By committing to support feedstuffs growers, the USRSB will continue and strengthen the relationship with FtM and other associations that have set goals to work towards common aims of improving ecological outcomes related to water use and quality.

How will we measure progress and achieve our goal?

The USRSB will achieve its outcome of benchmarking water quality and use by 2025, and consequently develop more detailed and actionable plans to achieve outcomes by that date.

How will progress towards the water resources goal improve outcomes?

While the USRSB will work to more comprehensively benchmark water use and quality, much progress can continue to be made through sector-specific targets and using tools and practices readily available to the U.S. beef industry today (Table 4).

Table 4. A non-exhaustive list of current tools and practices that can positively improve outcomes for water use and water quality. Further information is available in the U.S. Beef Industry Sustainability Framework (USRSB, 2019).

Examples of tools and practices	Water use	Water quality
COW-CALF		
Grazing management plans	X	X
Riparian zone management		X
Water infrastructure upgrades and maintenance	X	
On-ranch irrigation efficiency for hay/forage crops (where deemed appropriate within the basin context)	X	
AUCTION MARKET & FEEDYARD		
Manure management (e.g., composting)		X
Water infrastructure upgrades & maintenance	X	X
Home-grown crop production <ul style="list-style-type: none"> • Nutrient and tillage mgmt. • Edge of field mgmt. • Irrigation efficiency (where deemed appropriate within the basin context) • Irrigation timing • Use of advanced genetics/drought resistant varieties 	X	X
PACKER & PROCESSOR		
Wastewater management (e.g., digesters, green infrastructure)		X
Water infrastructure upgrades and maintenance	X	X
Water reuse	X	
RETAIL & FOOD SERVICE		
Integrated pest management		X
Low water landscapes	X	X
Water infrastructure upgrades and maintenance	X	X
Water reuse	X	



WATER RESOURCES SECTOR TARGETS

Sector targets have been developed to support the USRSB beef industry goals. Recognizing that continuous improvement is about better outcomes, the USRSB seeks to develop goals and targets that will help improve performance by the industry as a whole as the net result of actions and achievements in each supply chain sector.

More information about the metrics, which are relevant to achieving sector targets, can be found in the sustainability assessment guides of the U.S. Beef Industry Sustainability Framework document.

COW-CALF

Existing metric

Is a grazing management plan (or equivalent) being implemented that maintains or improves water resources?

Sector target

385 million acres covered by a written grazing management plan by 2050.

AUCTION MARKET

Existing metric

Are water resource management strategies implemented at the auction barn that address water management, water use optimization and conservation and water quality?

Sector target

All USRSB member organizations representing livestock markets that handle cattle have implemented a water management plan by 2030.

FEEDYARD

Existing metric

Are water resource management strategies implemented at the feedyard that address water management, water use optimization and conservation and water quality?

Sector target

All feedyards are assessing water availability and implementing water conservation management practices by 2030.

PACKER & PROCESSOR

Existing metric

LEVEL 1

Is a water resource management plan implemented at the facility?

LEVEL 2

How many wastewater permit non-compliances has the facility had in the previous calendar year?

What is the water use in gallons/head/day (packers) or gallons/pound of beef processed (processors)?

LEVEL 3

Does the company track discharge water quality over time?

Does the company have set goals for continued improvement?

Does the company make water performance efforts public?

Does the company participate in partnerships, initiatives or programs to further advance water resource management?

Sector target

All beef packers and processors have assessed water risk and impacts of their direct operations and assessed water risks in key sourcing regions by 2030; and

All beef packers and processors have implemented concrete steps (e.g., support technical or financial assistance, transparency efforts) to encourage adoption of the U.S. Beef Industry Sustainability Framework water metrics in the U.S. beef value chain by 2030.

RETAIL & FOODSERVICE

Existing metric

LEVEL 1

Has the company assessed the water risk of its operations and locations?

LEVEL 2

Does the company have a plan for water resource and risk management, including both quantity and quality impacts?

Has the company assessed the water risk of its direct beef suppliers?

Does the company engage suppliers and encourage adoption of USRSB water resource metrics in its beef value chain?

LEVEL 3

Is the company participating in a credible system for reporting water stewardship?

Has the company set water targets based on its assessments?

Can the company demonstrate progress towards these targets?

Does the company track performance on water stewardship in its beef value chain?

Sector target

All USRSB member retail and foodservice companies have assessed the water risk and impacts of both direct operations and of their beef suppliers by 2025 and are implementing improvement plans, tracking performance and publicly reporting progress of water stewardship across the company's sourcing footprint by 2030; and

All USRSB member retail and foodservice companies have implemented concrete steps (e.g., support technical or financial assistance, transparency efforts) to encourage adoption of the U.S. Beef Industry Sustainability Framework water metrics in the U.S. beef value chain by 2030.



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EMPLOYEE SAFETY & WELL-BEING

The U.S. beef supply chain is committed to continuously improving the safety, development and well-being of individuals working throughout the industry. We will do this by:

- Reducing the Total Recordable Incident Rate (TRIR) by 50% by 2030 in relevant operations; and
- 10% year-over-year increase in individuals trained for stockmanship and safety through identified programs to reduce injuries on farms and ranches.

EMPLOYEE SAFETY & WELL-BEING CONTEXT

For members of the U.S. beef industry to be truly sustainable organizations, they must showcase their values, including their commitment to employee safety, training and well-being. The USRSB and the entire industry recognize that these are table stakes for businesses of all sizes and types – a moral imperative and also essential for accomplishing day-to-day business operations.

The employee safety & well-being indicator specifically covers safety programs and training and other hallmark protections of safe workplaces.

Providing a safe workplace has rewards for both the employee and the employer and can be seen in improved morale, increased productivity, reduced costs and less absenteeism (Daigle and Ridge, 2018). The Occupational Safety and Health Act (OSHA) was established in 1970 and was the first comprehensive safety and health regulation covering U.S. workplaces. Employers are held responsible for meeting those standards, which include training, implementing effective safety programs, maintaining equipment and reducing workplace hazards. Though OSHA sets the minimum standards for employee safety, each employer should continuously assess potential hazards in an effort to address these before they cause an injury or illness. Additionally, it is recognized that employee safety is a necessary and critical component of sustainable businesses (OSHA, 2018).

USRSB employee safety & well-being definition

The implementation of safety programs and training to provide a safe workplace and help to prevent workplace accidents and injuries associated with production, processing, and distribution of beef and the relative prosperity of workers employed in those activities (U.S. Beef Industry Sustainability Framework, 2019).

Adopting principles of good stockmanship and safety procedures on the farm, ranch, auction market or feedyard improves the safety and well-being of farm and ranch employees by reducing injury and allowing more confidence and pride to be cultivated in their work. In addition, trained employees using these practices reduce cattle stress and injuries, thereby improving the health and well-being of the animals (Coleman and Hemsworth, 2014). Moreover, cattle under low-stress conditions and reduced injury risk perform better, improving the efficiency and yield indicator by improving profitability for the cattle producer.

Why focus on Total Recordable Incident Rate?

The Total Recordable Incident Rate (TRIR) is an outcome-based metric that can be measured and stakeholders and actors within the U.S. beef value cattle can have confidence that a 50% reduction in TRIR will have material benefits to employees and society-at-large.



Why focus on training for stockmanship and safety training?

While some segments of our operations within the U.S. beef value chain readily track safety or injury outcomes in a standardized manner (i.e., TRIR), not all operations or segments do. However, all segments are committed to the safety of those working within the beef value chain. Training plays a key role in making sure everyone in an operation is following the same procedures for employee safety and well-being, as well as animal health and well-being (Coleman and Hemsworth, 2014; Daigle and Ridge, 2018). If employees are not trained and procedures for stockmanship and safety are not properly implemented, risk of injury or death to an operation's employees is elevated. Increasing the number of farms, ranches, auction markets, feedyards and packers in the U.S. who train their employees regarding stockmanship and safety can help prevent workplace accidents and injuries associated with production, transport and slaughter of cattle. It can also improve animal health and well-being on that operation. Further sector-specific information on training programs is available in the U.S. Beef Industry Sustainability Framework (USRSB, 2019).

How will progress on the goal be tracked over time?

For operations that report TRIR information, operations will be surveyed to report their progress towards the goal. For sectors and operations that do not readily track and report TRIR information, the number of trainings will be tracked via survey and recording of individuals trained in formal events such as the National Cattlemen's Beef Association Stockmanship and Stewardship program.

How does the goal improve the well-being of people working within the U.S. beef value chain?

There has been an extensive focus across society recently on health and safety, highlighted by COVID-19. The U.S. beef industry recognizes the moral and ethical responsibility to support worker safety and well-being, without exception. COVID-19 has highlighted this imperative, and the U.S. beef industry must respond with a commensurate level of ambition and commitment. In addition, organizations are increasingly being asked questions about diversity, inclusion and equity in the workplace, with expectations covering gender, race, ethnicity, communities, etc.

The USRSB acknowledges the importance of these societal issues and encourages its members to identify these issues and seek improvement in all of their businesses or operations. However, as the current high priority for employee safety and well-being is focused primarily on the safety of those individuals working within the value chain, the goals and targets have been crafted to quantifiably improve safety outcomes across the U.S. beef industry. As with all indicators, the USRSB may choose in the future to broaden the scope of its indicators or add additional indicators as needed.



EMPLOYEE SAFETY & WELL-BEING SECTOR TARGETS

Sector targets have been developed to support the USRSB beef industry goals. Recognizing that continuous improvement is about better outcomes, the USRSB seeks to develop goals and targets that will help improve performance by the industry as a whole as the net result of actions and achievements in each supply chain sector.

More information about the metrics, which are relevant to achieving sector targets, can be found in the sustainability assessment guides of the U.S. Beef Industry Sustainability Framework document.

COW-CALF

Existing metric

Are all individuals who are involved in the operation trained in stockmanship and safety and are they implementing these practices on the farm or ranch?

Sector target

10% year-over-year increase in individuals trained for stockmanship and safety.

AUCTION MARKET

Existing metric

Is an employee safety program in place?

Sector target

All livestock marketing businesses handling cattle represented by USRSB member organizations will have documented and implemented an employee safety plan by 2030.

FEEDYARD

Existing metric

Are feedyard employees trained and is an employee safety program implemented at the feedyard?

Sector target

All feedyard employees will be trained in relevant safety protocols by 2030.

PACKER & PROCESSOR

Existing metric

LEVEL 1

Does the company have a documented employee safety and well-being program that engages front-line employees and leadership?

LEVEL 2

Does the company track Total Recordable Incident Rates (TRIR)?

LEVEL 3

Does the company track trends on TRIR and reference rates against the NAICS industry standard rate to set goals for the upcoming year?

Does the company participate in partnerships, initiatives or programs to further advance employee safety and well-being?

Sector target

All companies have a robust employee safety program by 2023.

Sector reduction in TRIR by 50% by 2030.

RETAIL & FOODSERVICE

Existing metric

LEVEL 1

Does the company have clearly documented policies and procedures around employee workplace safety and training programs?

Does the company require training on food safety and handling techniques for beef?

LEVEL 2

Does the company have a supplier code of conduct (or equivalent) that includes employee health and safety policies and have a system for tracking compliance of its beef suppliers?

LEVEL 3

Does the company track the number of direct company employees (not value chain) completing safety and training programs?

Sector target

All USRSB member retail and foodservice companies have employee workplace and food safety training in place by 2023.

All USRSB member retail and foodservice companies have a public code of conduct (or equivalent) that includes employee health and safety policies and have a system for tracking compliance of their own operations and their U.S. beef suppliers by 2023.



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ANIMAL HEALTH & WELL-BEING

The U.S. beef supply chain will continue to improve animal health and well-being. We will do this by:

- Strengthening our commitment to the highest standards of animal care; and
- Achieving sector-relevant targets linked to optimal animal care through increased participation in trainings, certification programs and implementation of policies.

ANIMAL HEALTH & WELL-BEING CONTEXT

Animal health and well-being is fundamentally important to the beef industry. It is a moral imperative for the industry to continue to care for animals in ways that are science-based, align with shared values of consumers and account for expectations of consumers and other stakeholders.

Animal health and well-being begins at the ranch level the moment a calf is born or arrives. The men and women that raise cattle have long recognized the need to properly care for livestock. Ranchers and producers have a moral and ethical responsibility to ensure, to the best of their ability, the health and well-being of the livestock in their care. Animal abuse is not acceptable under any circumstances. Technological advancements and sound animal husbandry practices, based on decades of practical experience and research (Grandin, 2015), are known to impact the well-being of cattle, individual animal health and herd productivity and result in fewer animal losses. Fewer losses also improve food security and the social well-being of communities (OIE, 2021) and reduce the chance and/or frequency of attracting predators into the proximity of cattle. USRSB's definition of animal health and well-being aligns with the OIE's definition for animal welfare: the physical and mental state of an animal in relation to the conditions in which it lives and dies (OIE, 2018)

As noted in the U.S. Beef Industry Sustainability Framework (USRSB, 2019), U.S. cattle are produced in very diverse environments and geographic locations. Due to geographic and economic diversity, there is not one specific set of production

USRSB animal health & well-being definition

The cumulative effects of cattle health, nutrition, care and comfort (U.S. Beef Industry Sustainability Framework, 2019).

practices that can be recommended to protect the health, nutrition, care and comfort of cattle for all producers. Personal experience, training and professional judgment are valuable resources for providing proper animal care.

However, as also noted in the U.S. Beef Industry Sustainability Framework (USRSB, 2019), several key considerations are consistent across the unique geographic regions and operations. For optimal animal health and well-being, ranchers and producers can incorporate four considerations in their management decisions and ranch practices when caring for their animals:

- Provide adequate feed, water, housing and care to protect cattle health and well-being
- Provide disease prevention practices to protect herd health
- Provide facilities that allow safe and humane movement and/or restraint of livestock
- Provide personnel with training to properly handle and care for cattle

The importance of animal health and well-being extends up the beef value chain. It affects every sector in the industry and, therefore, every business has a stake in the continuous improvement of cattle health, nutrition, care and comfort. As such, USRSB has developed sector-relevant targets to support our overarching animal health and well-being indicator goal, as outlined in the following section.



ANIMAL HEALTH & WELL-BEING SECTOR-LEVEL METRICS & TARGETS

Recognizing that continuous improvement is about better outcomes, the USRSB seeks to develop goals and targets that will help improve performance by the industry as a whole as the net result of actions and achievements in each supply chain sector.

More information about the metrics, which are relevant to achieving sector targets, can be found in the sustainability assessment guides of the U.S. Beef Industry Sustainability Framework document.

COW-CALF

Existing metric

Has the operation adopted Beef Quality Assurance (BQA) or similar program principles into management of the farm or ranch?

Sector target

Increase the number of individuals trained and certified in BQA or equivalent by 10% year-over-year.

AUCTION MARKET

Existing metric

Are employees trained and auction-specific Beef Quality Assurance (BQA) principles being implemented at the auction market?

Sector target

All cattle handling employees of livestock marketing businesses represented by USRSB member organizations are trained through BQA or Livestock Marketing Association (LMA) by 2030.

FEEDYARD

Existing metric

Are feedyard employees trained in Beef Quality Assurance (BQA) principles and are these principles implemented at the feedyard?

Sector target

All feedyard employees in a livestock handling role are trained and certified in BQA principles by 2030.

PACKER & PROCESSOR

Existing metric

LEVEL 1

Packer: Does the company have a comprehensive animal welfare program including third-party verification?

Processor: Does the company have a documented animal welfare policy (or equivalent) and encourage the adoption of the U.S. Beef Industry Sustainability Framework's animal health and well-being metrics?

LEVEL 2

Packer: What was your company's total number of USDA non-compliance animal welfare violations per 100,000 head processed in the previous calendar year?

Packer: What percentage of cattle come under a third-party audit? What percentage pass on first audit?

Processor: Does the company use second-or-third party animal welfare audits, such as the North American Meat Institute's (NAMI) Animal Handling Guidelines and Audit Guide, to verify policy compliance to at least the packer level?

LEVEL 3

Does the company track animal health and well-being over time and set goals for continued improvement?

Does the company engage its suppliers or participate in partnerships, initiatives or programs and/or engage its suppliers to advance continuous improvement regarding animal health and well-being in the beef value chain?

Sector target

By 2025, all beef packers who handle animals will pass third-party animal transport and handling audits and all packers and processors will require all suppliers to implement mandatory employee training and follow BQA standards for animal care.

RETAIL & FOODSERVICE

Existing metric

LEVEL 1

Does the company have a documented and publicly available animal care and handling policy?

Does the company encourage the adoption of USRSB metrics in its beef value chain?

LEVEL 2

Does the company verify compliance with its policy at least to the packer level?

Does the company have a policy for audit failures?

LEVEL 3

Does the company engage its suppliers on continuous improvement and emerging issues regarding animal health and well-being in its beef supply chain?

Does the company track and assess progress on animal health and well-being outcomes that align with its policy?

Sector target

All USRSB member retail and foodservice companies have a publicly available animal care and well-being policy by 2023.

All USRSB member retail and foodservice companies have implemented concrete steps to encourage the adoption of U.S. Beef Industry Framework metrics and measuring progress against metrics by 2025.



Why the emphasis on training of Beef Quality Assurance or equivalent principles?

The national Beef Quality Assurance (BQA) program provides educational resources to improve beef safety and quality while improving cattle well-being. The program also raises consumer confidence by offering proper cattle management techniques and a commitment to quality within every sector of the beef industry. The BQA program began efforts more than 40 years ago to develop education and training materials for beef quality and safety assurance. The first National Beef Quality Audit was conducted in 1991 and is conducted every 5 years to evaluate beef industry efforts and share results on progress and areas for improvement.

Beef Quality Assurance tools are the result of years of scientific research and practical experience and are continually updated to provide the latest in animal management information and technologies. These tools include guidelines on the proper administration of animal health products, best management practices for animal well-being and animal handling recommendations. Beef Quality Assurance recommended practices are consistent with the World Organization for Animal Health (OIE) code, which provides global standards for animal well-being and beef cattle production systems (OIE, 2017).

The BQA program provides producers with manuals, videos, templates, training resources and assessment tools which can be used on a voluntary basis to improve their operations. As producers incorporate BQA or similar programs, they can assess and identify the strengths and weaknesses of their operation, and once the weaknesses are identified, they can allocate available resources to make improvements. Furthermore, the National Cattlemen's Beef Association recently established the U.S. Cattle Industry Feedyard Audit (NCBA, 2021), which is certified by the Professional Animal Auditor Certification Organization (PAACO, 2021). This new comprehensive audit tool is in agreement with BQA standards and provides verification to beef stakeholders and customers that a feedyard is in compliance with the BQA program. As more producers adopt and participate in these programs, cattle health, nutrition, care and comfort are better communicated and improved across the industry. Certification programs and a national audit that monitors program uptake across the producer participants are both part of BQA. More information on how BQA or equivalent principles enhance animal health and well-being can be found in the U.S. Beef Industry Sustainability Framework and further information on the BQA program can be found at bqa.org or ncba.org.

Do we know training in animal handling and BQA equivalent principles leads to better animal health and well-being outcomes?

The following improvements in the animal health and well-being sustainability outcomes can be realized if an operation has implemented the following principles outlined in the BQA program:

- Ensure the proper care, handling and transport of all animals
- Manage for healthy, low-stressed animals
- Reduce the use/need for animal health products or interventions
- Reduce the risk of injury to employees

The past four decades have demonstrated that proper training in BQA or equivalent principles can move outcomes in beef quality, as has been demonstrated in the National Beef Quality Audit

(NBQA) that is completed by the U.S. beef industry every five years. The scope and assessment of the elements included in the NBQA (carcass pathology and defects, antemortem observations, mud scoring, transport conditions, etc.) demonstrate both the improvements in welfare and the uptake of principles, as shown in the examples below on injection site lesions (Figure 3A) and arthritic joints (Figure 3B) as well as in unbranded hides (Table 5) and prevalence of horns (Table 6).

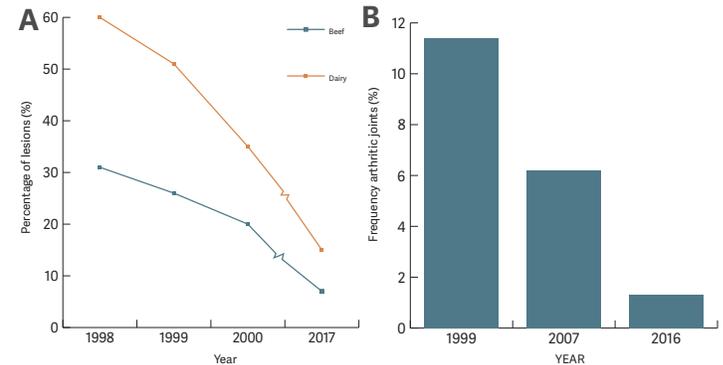


Figure 3. Historic data from the National Beef Quality Audit demonstrating (A) the reduction in percentage of rounds with an injection-site lesion and (B) the reduced frequency of arthritic joints as a result of Beef Quality Assurance or equivalent principles.¹

¹Adapted from BQA (2016).

Table 5. Percentages of hot-iron brands on hide-on carcasses found during National Beef Quality Audits from 1991 to 2016¹

Item	1991	1995	2000	2005	2011	2016
No brand	55.0	47.7	49.3	61.3	55.2	74.3
Butt brand	29.9	38.7	36.3	26.5	35.2	18.6
Side brand	13.8	16.8	13.7	7.4	9.0	6.3
Shoulder brand	0.8	3.0	3.6	1.2	2.5	1.3
Cattle with multiple brands	2.1	6.2	4.4	3.6	9.9	1.6

¹Total exceeded 100% due to animals having multiple brands; Adapted from BQA (2016).

Table 6. Percentages of hide-on carcasses evaluated for presence of horns during National Beef Quality Audits from 1991 to 2016.¹

Item	1991	1995	2000	2005	2011	2016
With horns	31.1	32.2	22.7	22.3	23.8	16.7
No horns	68.9	67.8	77.3	77.7	76.2	83.3

¹Adapted from BQA (2016).

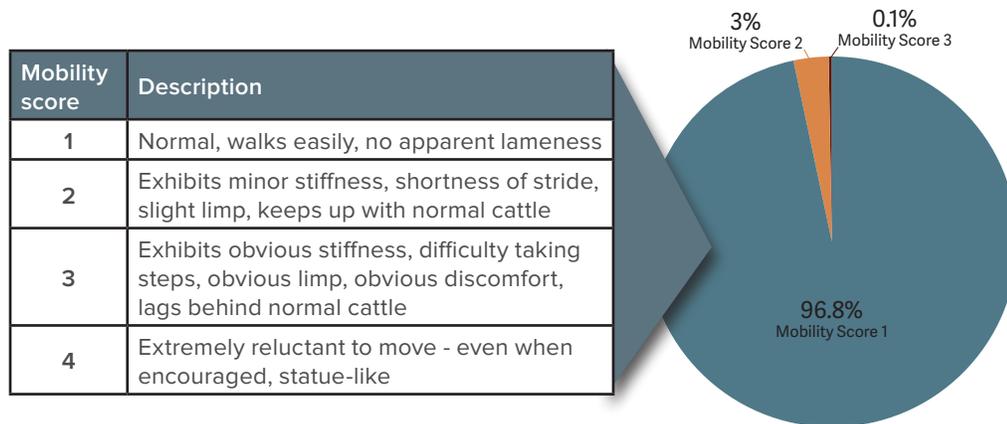


Figure 4. Fed cattle mobility scores upon arrival at packing plants.¹

¹Adapted from BQA (2016), with original data from the North American Meat Institute; Due to rounding of percentages, the total does not add to 100.

In addition, newer measures that focus on cattle comfort and physical conditions, such as transport conditions (Table 7) and fed cattle mobility (Figure 4), have been incorporated into the audit as validated measures and are published in the scientific literature (BQA, 2016).

How will progress towards the goal and sector targets be tracked?

The USRSB has a variety of methods and data sources available to track progress on the goal and sector targets for animal health and well-being. For BQA or equivalent training certifications, the National Cattlemen’s Beef Association maintains a database of active certifications and equivalents which can be referenced annually. Additionally, linking training to animal health and well-being outcomes can be periodically tracked through USDA’s National Animal Health Monitoring System reports for cow-calf and feedlot cattle and the National Beef Quality Audit. For the packer/processor sector, the North American Meat Institute (NAMI) is developing capabilities to track progress on Protein PACT goals which are equivalent to the sector’s USRSB target (NAMI, 2021). Methodology to track progress for the retail and food service sector’s targets (e.g., member survey) will be developed.

Do the goal and targets impact antibiotic stewardship?

The US Beef Industry Sustainability framework provides further in-depth details of how the USRSB addresses antibiotic stewardship and how BQA or equivalent principles address judicious use of antibiotics.

In brief, BQA outlines details of what is included in a complete cattle health program. This includes 14 guidelines for the judicious use of antibiotics which outlines principles of prevention, careful selection and use of antibiotics, guidance to treat the fewest number of animals as possible, and robust record keeping.

Table 7. Mean values for time and distance traveled, number of cattle per load, trailer dimensions, and subsequent area allotted per head of cattle for all trailer types surveyed in the National Beef Quality Audit (BQA, 2016).¹

Measurement	Number of audits (n)	Mean	Standard deviation	Min.	Max.
Time traveled (h)	220	2.7	2.4	0.25	12.0
Distance traveled (miles)	217	135.8	132.5	8.0	870.0
Number of cattle in load	220	36.6	4.8	10.0	47.0
Number of compartments used	217	3.5	0.9	2.0	6.0
Trailer dimensions (ft ³)	212	439.7	27.6	192.0	636.0
Area allotted per head (ft ³)	212	12.2	1.8	9.2	24.5

¹Adapted from BQA (2016); Approximately 10% of cattle trucks were sampled within a day’s production at each plant.



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EFFICIENCY & YIELD

The U.S. beef supply chain will improve efficiencies, enhance product value and increase demand, which collectively will enable operations and businesses to maintain and improve individual and community financial health.

EFFICIENCY & YIELD CONTEXT

At a high level, efficiency and yield encompasses sustainable economic viability and responsibly stewarding resources. Profitability is essential to the long-term future of the entire value chain.

Fundamentally, the U.S. beef industry exists to transform lower value inputs (forages and grains) into a high-quality and desirable protein source to nourish people. Improving the efficiency of this transformation and minimizing waste (resources, time and capital) through the beef value chain is a major driver of beef's continuous improvement in sustainability. Improved efficiency influences other important aspects of beef sustainability, such as long-term economic viability of individual operations within the chain, the well-being of employees and rural livelihoods and the preservation and enhancement of important ecosystems.

Additionally, improved efficiency and yield depends substantially on factors expressed in the other five high-priority sustainability indicators: air and greenhouse gas emissions; land resources; water resources; employee safety and well-being; and animal health and well-being. Because efficiency and yield intersects on so many levels with these other indicators, performance in these areas is identified as a key driver of progress and, therefore, is a key consideration for the development of the goals and targets for efficiency and yield.

Economic viability, for the purposes of the efficiency and yield indicator, also depends on enhancing demand for beef. Building consumer trust in the U.S. beef industry is a key lever for enhancing reputation and, therefore, increasing demand for beef. A deliberate objective of the USRSB's work is to help build trust in the industry, by demonstrating continuous improvement across all six high-priority indicators in the U.S. Beef Industry Sustainability Framework (USRSB, 2019). By leveraging the USRSB's position as the voice of the industry, the USRSB will support and amplify the trust-building efforts of individual facilities related to sustainability performance.

USRSB efficiency & yield definition

Efficiency is the unit of input required to produce a unit of output. Yield is the total product generated per unit of time or space. Both concepts consider waste a negative characteristic and drive toward improved profitability. (U.S. Beef Industry Sustainability Framework, 2019)

Why this goal?

This goal statement reflects two important facts:

- The financial health of the U.S. beef industry depends on many drivers.
- Financial health is critical for sustaining operations and businesses, feeding people and supporting communities.

This goal also supports, and is supported by, improved outcomes across all of the other indicators in the U.S. Beef Industry Sustainability Framework (USRSB, 2019).

This goal statement also reflects these assumptions:

1. Improving financial health of individual operations and communities that are stewarding important ecosystem services is paramount for the continuation of those ecosystems' goods and services.
2. Continuous improvement in efficiency and yield and other USRSB indicators is a critical component of enhancing the value and demand for beef. Willingness-to-pay for beef is already influenced by sustainability outcomes, and the importance of issues related to sustainability, such as greenhouse gas emissions and animal well-being, on consumer demand is only likely to grow in the future. As the USRSB is dedicated to continuous improvement of all U.S. beef, our focus on demand and value enhancement is inherent to driving a more sustainable beef supply.



3. Stockmanship and safety training lead to improved efficiency and yield. In cattle production, if an operation's employees are trained and implement proper stockmanship and safety procedures, there will be reduced injury to employees and animals, reduced employee turnover and reduced cattle stress. Together, these improved outcomes translate to improved operational efficiency and yield.
4. Contributions towards outcomes aligned with this goal statement will vary by sector. The U.S. beef industry is characterized by significant variability related to several factors, including but not limited to: production density, operation size, geographic location, climate, local regulatory approaches, culture/custom, etc. The resources in the sustainability assessment guides within the U.S. Beef Industry Sustainability Framework (USRSB, 2019) reflect this variability. In addition, it is important for the USRSB, and sector members themselves, to identify and address sector-specific barriers to sustainable economic viability.

Why does the goal not have a time-bound, quantifiable objective for the industry?

While efficiency and optimizing yield is a universal desirable outcome across the beef value chain, the inputs of interest vary widely across sectors of the chain and even regionally depending upon the operation within a sector. Sector-specific targets highlight key outcomes that each sector will work to improve and track over time.

Additionally, sharing information across the value chain as it relates to economic efficiency measures can potentially raise anti-competitive issues. Consequently, the goal remains high-level and focused on improving sector- and operation-relevant efficiencies.

The USRSB has used a wide range of data sources to help establish historical and current conditions. Information that is currently available may be more or less granular, but it provides some degree of insight into the current situation, as well as past and expected future progress on specific criteria related to the efficiency and yield indicator.

How will we improve outcomes?

There are three primary levers for achieving progress on the efficiency and yield goal:

- Animal productivity on a per-unit basis
- Resource use on a per-unit basis
- Product loss and waste

All three can be directly controlled by individual entities in relevant sectors of the beef industry and/or indirectly influenced through supply chain arrangements and specifications.

Improving outcomes on efficiency and yield will depend upon adoption of management practices across all sectors that contribute to optimized animal productivity and optimized resource use, including reduced loss and waste. In addition, progress will come from driving demand for beef and achieving progress across the other indicators in the U.S. Beef Industry Sustainability Framework (USRSB, 2019). Lastly, progress will come from strong engagement with consumers and other stakeholders to demonstrate the industry's good work and enhance industry reputation.

How will we measure progress?

The USRSB intends to measure progress on efficiency and yield primarily through:

- Multiple productivity metrics, as described in each sector's sustainability assessment guides (USRSB, 2019)
- Sector targets related to efficiency and yield
- Demand metrics such as reputation measures and national and regional purchase data

For efficiency and yield measures related to animal performance and live cattle production, multiple national assessments can be used to track improvements over time, such as USDA-NASS survey data and National Animal Health Monitoring System (NAHMS) reports. For food waste measures where national surveys may not yet exist, the USRSB will work with partners to identify appropriate data sources.



EFFICIENCY & YIELD SECTOR TARGETS

The following tables highlight targets developed by and specific to each sector. The focus of each sector varies. The cow-calf sector is focused on developing a financial health index to use as an encompassing indicator of success in the advancement of the metric. The feedyard sector is focused both on cattle efficiency (e.g., measures such as feed efficiency) and operational efficiency. Both the packer/processor and retail/foodservice sectors are focused on reducing food waste.

More information about the metrics, which are relevant to achieving sector targets, can be found in the sustainability assessment guides of the U.S. Beef Industry Sustainability Framework document.

COW-CALF

Existing metric

Is there a strategy implemented to optimize animal productivity through improved nutrition, reproduction, genetics, technologies and practices?

Sector target

Develop a cow-calf financial health index and set sector targets for improvement by 2025.

FEEDYARD

Existing metric

Are cattle performance and operational efficiency tracked over time for this facility?

Sector target

Continue to enhance cattle performance and feedyard efficiency.

PACKER & PROCESSOR

Existing metric

Level 1

Is a program to divert waste from landfills implemented at the facility?

Level 2

How much mass of waste/head or waste/mass of finished product does the company divert from landfill?

Level 3

Does the company track waste reduction over time and set goals for continued improvement?

Does the company participate in partnerships, initiatives or programs to further advance waste reduction strategies?

Sector target

All beef packers and processors are delivering on a public-facing food waste reduction goal by 2030.

By 2030, all beef packers and processors have implemented a zero waste to landfill diversion program and goal that is audited by an accredited third party to a published standard.

RETAIL & FOODSERVICE

Existing metric

Level 1

Has the company assessed food waste in its own operations?

Level 2

Does the company have programs focused on reducing food waste in its operations, including beef waste?

Does the company have policies that encourage adoption of the Framework's metrics and enable suppliers to find alternative uses for safe, wholesome surplus products (beef, in particular)?

Level 3

Does the company set targets and track performance of its food waste reduction programs, including beef?

Does the company engage its direct suppliers and track performance on food waste reduction in its beef value chain?

Sector target

All USRSB member retail and foodservice companies have assessed food waste and have set a target to reduce food waste by 2023 and are reporting progress publicly by 2025.

References:

USRSB. 2019. U.S. Beef Industry Sustainability Framework, U.S. Roundtable for Sustainable Beef retrieved from: <https://www.beefsustainability.us/>