

## Project summary

The goal of the Bovine Innovative Greenhouse Gas Solutions (BIGGS) Pilot Project is for stakeholders in the U.S. beef and dairy supply chain to successfully participate in a voluntary greenhouse gas (GHG) offset program that is science-based and meets their triple bottom-line needs and concerns.

The BIGGS pilot project will adapt and test GHG methodologies that generate voluntary carbon offsets and demonstrate decreased carbon intensity of beef and milk produced in the beef and dairy sectors with the following outcomes:

1. Design scalable approaches for large GHG reduction tonnage
  - a. Adapt four Alberta, Canada Government-approved protocols for reducing enteric methane and manure-based emissions, to the unique scientific and production system characteristics of the U.S. beef, dairy and carbon supply chains
  - b. Align Canadian and U.S. bovine GHG reducing practices and carbon quantification methods
  - c. Create carbon market linkages between domestic bovine voluntary carbon market standards (e.g. American Carbon Registry and the Climate Action Reserve)
2. Develop best practices/systems associated with voluntary bovine GHG offsets
  - a. Streamline complex data management requirements
  - b. Create diverse systems producers can use to quantify voluntary offsets
  - c. Monetize and serialize verifiable carbon offsets
3. Close knowledge gaps associated with bovine-targeted voluntary GHG offsets
  - a. Increase awareness and understanding of supply chain stakeholders through firsthand experience with voluntary offsets associated with their operations (the pilot will work with a total of 25,000 head of dairy cattle and 500,000 head of beef feedyard animals)
  - b. Assess the costs, benefits and potential production efficiency gains realized by feedyard and dairy operations when implementing the GHG-reducing practices

The project breaks down into the following phases over a 3-year period:

1. **Protocol adaptation:** Adapting four Alberta, Canadian protocols to fit U.S. science and production systems.
2. **Design and development:** Producer outreach to enroll them in the process while engaging key supply chain stakeholders to develop a unified and aligned solution-oriented approach.
3. **Implementation:** Harvesting and analyzing applicable data from individual feed yards/dairies, and third party managed data information systems to field test the protocols. Applying statistical sampling protocols to harvest the applicable data. Assessing the baseline GHG emissions from the project (feedyard or dairy) and qualifying carbon by calculating the difference (reduction) between baseline emissions and project emissions after practice was implemented.
4. **Operations:** Setting up data management systems; assembling all qualified project reductions together through aggregation; developing project documentation; proceeding with project monitoring, measuring and reporting; registering, verifying and monitoring projects with a credible Carbon Registry for continued carbon credit generation.
5. **Market demonstration:** Sale of high quality carbon credits to the voluntary market, with an emphasis on supply chain stakeholders.
6. **Evaluation:** Debriefing the key accomplishments, discoveries and gaps identified in the pilot project.

<sup>1</sup> Triple bottom-line as defined by Freer Spreckley to mean environmentally sustainable, socially responsible and economically viable.

**Q&A**

1. What are the major goals of the project?
  - a. Pilot test methodologies that quantify carbon offsets in the U.S. beef and dairy sector.
  
2. What is the project timeline?
  - a. Years 1 & 2 – Protocol adaptation, Design and development, Implementation
  - b. Years 2 & 3 – Implementation, Operations, Market demonstration and Evaluation
  
3. Which GHGs are targeted by the project, and/or which activities?
  - a. Bovine enteric methane and manure-based methane and nitrous oxide emissions
  
4. Can you provide an estimate of tons of CO<sub>2</sub>equivalents (per year, and/or over the course of the project) that the project might mitigate/abate?

<b>Protocol</b>	<b>Tonnes CO<sub>2</sub>e reduction/head/year</b>	<b>Total potential Tonnes CO<sub>2</sub>e reduction/year*</b>
Edible oils/Corn DDGS	0.29	145,000
Reducing age to harvest	0.75 / 3 month reduction	375,500
Reduced days on feed	0.04 / 7 day reduction	20,000
Dairy manure basin management; feeding strategies	1.0	25,000

\* based on 500,000 head of beef cattle; 25,000 head of dairy cattle; tons are theoretical potentials based on Alberta protocol estimates

5. What methods or protocols will the project use to measure or estimate GHG emissions and emissions reductions (e.g. direct measurement, sampling, models, etc.)  
 The following Alberta offset system protocols:
  - a. Edible oils – inclusion of dietary fats in the 4 to 6% range DM content of the diet (plant oils, tallow, Corn DDGS, and possibly other sources) to suppress rumen methanogenesis;
  - b. Reducing age to harvest – reducing the amount of time beef cattle spend on maintenance or lower average daily gain forage-based diets with higher methane emission factors (e.g. backgrounding);
  - c. Reduced days on feed – shortening the time beef cattle spend in the feedlot through better sorting procedures, individual animal performance monitoring, use of additives like beta-agonists, and other performance enhancement strategies (can be additive);
  - d. Dairy management - ration changes and additives to reduce enteric methane, emptying lagoons to avoid methane emissions, increase heifer replacement rates and other strategies.

The Alberta protocols are based on best practice guidance, including industry, US-EPA and Canada

customized quantification approaches for IPCC Tier 2 and 3 methodologies.

6. Do you anticipate or envision any obstacles or barriers to achieving your project goals and outcomes as currently set out, or activities that you believe will be challenging?
  - a. **Data availability** – Feedyard/Dairy operation’s feed, performance and animal inventory data availability back to 2003 (preliminary baseline year);
  - b. **Skepticism** – We expect initial skepticism by stakeholders/participants at the outset of the project, but we expect to break down this skepticism as bridge the science, policy and management aspects with practical constructive experiences.
  - c. **Data access** – Initial pushback on the data intensive nature of the process, but as we streamline the engagement with cooperators, and forge cost-effective project management, verification and registration procedures, the cooperators will have their time optimized so that it is not onerous to engage in the pilot;
  - d. **Market value of credits** – Risk that potential buyers don’t place an appropriate market value on these ‘pre-compliance’ quality credits and/or that voluntary carbon markets stall over the course of the pilot.
  
7. Have you identified any data or knowledge gaps associated with the project?
  - a. Yes, we have identified a few gaps in the required historical data based on implementation of similar pilots in Canada, but these can be addressed moving forward.
  
8. Please list the project partners affiliated with the project.

**Project collaborators**

  - Unison Resource Company – Matt Sutton-Vermeulen
  - Global Sustainable Solutions – Garth Boyd , Ph.D., PAS
  - KHK Consulting Ltd. – Karen Haugen-Kozyra, M.Sc., P.Ag.
  - San Francisco Carbon Collaborative
  - EcoAnalytics

**Project supporters**

  - Atlantic Dairy and Forage Institute, New Canaan, NB, Canada – Technical support
  - Beef Marketing Group, Great Bend, KS – Cooperating feedyards
  - Camco, Broomfield, CO– Purchase of carbon credits; technical support
  - Fair Oaks Dairy, Fair Oaks, IN – Cooperating dairies
  - Texas Cattle Feeders Association, Amarillo, TX – Cooperating feed yards & Communications
  - World Wildlife Fund, Washington, DC – Legal and monetary support
  - Leading Carbon – Purchase of carbon credits
  - ClimateCHECK, San Francisco, CA – on-line data management platform