BREAKTHROUGH INSTITUTE

August, 11 2023

Dear Chief Economist Meyer,

The Breakthrough Institute and the Director of theGrazingland Animal Nutrition Laboratory, Dr. Doug Tolleson, submits the following comments in response to the Notice of Request for Public Input on the *Federal Strategy To Advance Greenhouse Gas Measurement and Monitoring for the Agriculture and Forest Sectors*. The Breakthrough Institute is a nonprofit organization that identifies and advocates for technological solutions to environmental challenges. We commend the USDA for its commitment to measuring and monitoring soil carbon and greenhouse gas (GHG) emissions. The federal strategy for animal agriculture and enteric methane reflects many recommendations that we have described in publications such as "We Can't Manage Cattle Methane Without Better Measurements."

To further the USDA's understanding of emerging research and data collection needs related to enteric methane in particular, we have identified several gaps and priorities in measurement technology, data collection, measurement capacity, and decision support tools. As detailed, below, we recommend that USDA and partner agencies aim to 1) reduce the cost and improve the reliability of enteric methane measurement technology; 2) update USDA surveys to collect data on livestock practices relevant to estimating methane emissions; 3) partner with the private sector where possible to expand data; 4) establish a research network, including fee-for-service sites, to complement existing and private sector research; and 5) regularly incorporate new research findings into decision-support tools such as COMET-Farm.

We believe that the implementation of these recommendations will greatly enhance USDA's efforts in addressing greenhouse gas emissions and foster a more sustainable future for agriculture.

Sincerely,
Chris Gambino, PhD, MPA, Senior Sustainable Livestock Analyst, The Breakthrough Institute, and
Doug Tolleson, PhD, Director- Grazingland Animal Nutrition Laboratory, Texas A&M AgriLife Research

1. Reduce the cost and improve the reliability of in situ enteric methane measurements
Addresses General Question 1

The Science and Research priorities listed in the GHG IWG strategy include: "Reduce the cost and improve the reliability of in situ soil carbon measurements for use in soil carbon monitoring systems." This is an important goal. We recommend that Federal agencies also add a priority of reducing the cost and improving the reliability of methane measurement technologies.

Current methane measurement options were developed for research purposes, not monitoring purposes, and as such they are designed to measure individual cattle emissions in control or treatment groups. However, their cost, operational knowledge requirements, and snapshot measurements mean they are unlikely to be adapted for on-farm measurements by producers who want to quantify their emissions reduction efforts. What's needed are technologies and products that can continuously measure methane emissions with little operational intervention.

Therefore, we recommend USDA prioritize the development of accurate, consistent, deployable, and affordable enteric methane measurement technologies. This is paramount for accurately assessing the effectiveness of changes in livestock management, such as adoption of feed additives, and estimating emissions within supply chains or specific products. Accurate on-farm (i.e., herd scale) measurement, conducted in a representative set of environments (as discussed in recommendation 4), is also needed to inform improved methane modeling or prediction, and any reporting or tracking of predictions.

Furthermore, development of on-farm measurement tools that are usable by producers would enable them to observe trends, test practices they believe could reduce emissions, and continuously improve their operations. The ability for livestock producers to "see" their emissions in real-time is vital for reducing their carbon footprint, particularly concerning enteric methane. A comparison can be drawn to oil and gas managers who are capable of identifying leaks, managing the issues, and reducing profit losses. While this level of real-time monitoring is currently not a reality on farms, providing producers with accurate tools for emission monitoring will instill confidence and empower them to address inefficiencies in their production systems.

It is important that the following three tiers of accurate methane measurement technologies co-exist:

- Individual animal measurement technology to prove product efficacy,
- On-farm/Herd scale measurements to foster innovation and beneficial changes, and
- Landscape-scale measurements to ensure emissions reduction through a top-down approach.

Researchers have access to individual animal measurement technology, and efforts are well-underway for top-down landscape monitoring. It's imperative that the USDA and partner agencies spur the development of in situ on-farm methane measurement technology, working closely with industry and producers in doing so.

2. Expand USDA survey data collection on dairy, feedlot, and cow-calf practices
Addresses Animal Agriculture Question 1

One of the Data and Data Products priorities listed in the GHG IWG strategy is to "Improve timeliness, reduce latency, and fill gaps in the activity data collected through surveys and used in GHG estimates." As the strategy proposes, USDA should expand collection of relevant data on

animal operations through existing USDA surveys. In particular, the following should be collected by different programs and surveys to fill gaps in data relevant for estimating enteric emissions:

- USDA should add to its ARMS questionnaires for dairy and cow-calf operations questions to collect data relevant for estimating methane emissions such as use of feed additives or methane biofilters, animal breed, composition of feed, and whether operations have a written plan for methane management. USDA should also more frequently administer an ARMS questionnaire to operations with cattle on feed, and include questions about methane mitigation practices.
- The major drivers of modeled enteric methane emissions are dry matter intake and dry matter digestibility. Most dairies and large feed yards regularly have their diets analyzed. To help fill knowledge gaps, it's worthwhile to ask for intake and digestibility data. Outside of NAHMS and ARMS, NRCS feed management plans have on-farm diet data and all organic operation cattle operations submit their dry matter intakes.

It may be possible to fill some gaps with industry data, as the strategy proposes. However, relying on industry estimates also creates unique challenges. Industry may cease to collect particular data or cease to provide USDA with access. Details on data collection or estimation may not be documented in a way aligned with USDA standards. And it may not be geographically representative or representative of all operation types. The above proposals for USDA data collection would help avoid these limitations. USDA data collection would also enable the agency to better assess the accuracy and uncertainty of private data sources, enhancing their value to the agency.

3. Establish USDA data sharing agreements and partnerships with private companies
Addresses Animal Agriculture Question 3 and General Questions 3

As the Federal Government looks to establish research networks to synthesize findings on GHG emissions from the livestock sector, it should consider leveraging existing research data from companies. Many companies developing feed additives, methane sensors, and other products to measure and reduce emissions have conducted or are conducting field trials. Synthesizing this data would improve modeling of the impact of different practices on emissions.

However, USDA and other agencies must prioritize producer and company needs, particularly for privacy, in any data sharing agreements. We recommend that USDA take measures to ensure farmer and rancher data privacy, such as those taken in existing USDA data collection programs. Data privacy is paramount to the success of development and use of in situ enteric methane technologies. In situ data has the potential to not only benefit the producers, but also—if anonymized and shared—enhance the overall understanding of methane emissions from various breeds, geographies, diets, and interventions. In the absence of data privacy guarantees it is unlikely that producers will willingly share measurement and production systems data.

4. Establish a geographically representative research network
Addresses Animal Agriculture question 3 and General Question 3

There are few institutions and sites with the equipment and scientific capacity to conduct rigorous assessments of the effectiveness of feed additives and other methane mitigation interventions. This slows development and commercialization of methane mitigation approaches. It can also bias research findings in several ways. Some bodies of enteric methane research are not representative of the wide range of environments and operations that characterize US dairy and cattle production. For example, as access to forages change across the US, so does the digestibility of cattle diets. Diet

digestibility is a major driver of enteric methane emissions. In addition, existing research is often focused on the most readily commercializable products, such as feed additives for concentrated production systems, leaving cow-calf and grazing operations under-researched.

Federal agencies should build off existing research sites to create a research network that represents multiple climate zones, soil types, and types of operations. One option may be to build the infrastructure needed and incorporate livestock at LTAR and ARS sites that do not currently have production animals. Not only does this create more representative research data, but it is forward thinking under a changing climate. It's likely the places where livestock are concentrated now will not be the best places to produce them in the future. Geographically diverse research leads to more representative data, bolstering the reliability and applicability of models.

By developing a network of sites, federal agencies could ensure that a) products are tested according to rigorous standards, b) data is accessible, interoperable, and able to be effectively used to inform modeling efforts, and c) that testing facilities are made available equally to companies regardless of location, size, or other characteristics.

5. Expand and continually update COMET-Farm and other decision-support tools
Addresses Data and Data Sharing Question 1

COMET-Farm currently enables users to explore the greenhouse gas impact of changing the number of animals they raise; diet fat content, grain type, and concentrate percentage; use of ionophores; and various manure management practices. As data collection, research, and modeling expands scientific understanding of the impact of additional practices on emissions, these should be incorporated into COMET-Farm on a regular and timely basis. To ensure stakeholder trust in models and decision-support tools, USDA should seek to make the underlying assumptions and model details, such as emissions factors, available for public scrutiny.

One source of data to work with is the Grazingland Animal Nutrition Lab, funded primarily by NRCS. Over the last 25 years, this lab has collected 100,000 fecal samples, primarily from beef and small ruminant producers. Based on analysis of dietary energy and protein dynamics, the dataset provides insight into forage quality. The lab has recently begun to use this data to predict methane emissions. While the full validation process remains underway, the dataset is emerging as a promising avenue for modeling extensive rangeland dynamics, bridging the gap between theory and practice. Furthermore, the exploration of spectrometry and the extraction of spectral data from the red, blue, and green imagery of fecal samples offer a cutting-edge dimension to the dataset's potential impact.

With NIFA's increased investment in methane mitigation, several studies are underway measuring methane emissions in pasture-based systems. NIFA requires data management plans, and these plans, if they do not already, should include how collected data should be organized and submitted for use in refining COMET-Farm and other decision support tools like the Grazingland Animal Nutrition Lab.