Reducing enteric methane emissions via methane inhibitors

THE CHALLENGE

Agrifood systems account for roughly one-third of all greenhouse gas (GHG) emissions globally, when food production, transport, processing, and retailing are considered (Crippa et al. 2021; IPCC 2022; Costa Jr et al. 2022). Methane emissions account for 35% of agrifood system GHG emissions (expressed in CO2e) consistently across developed and developing countries (Crippa et al. 2021), with livestock production being the most significant contributor. Indeed, livestock emissions from manure and enteric fermentation represent 32% of all global anthropogenic emissions of methane (Global Methane Assessment 2021).

Methane is an extremely powerful GHG, and the need for action is urgent. Unlike carbon dioxide, which stays in the atmosphere for hundreds of years, methane starts breaking down quickly, with most of it gone after a decade. This means cutting methane emissions now can rapidly reduce the rate of warming in the near term.

HOW CAN METHANE INHIBITORS HELP US REDUCE EMISSIONS FROM LIVESTOCK?

Climate Action Tracker have set the 1.5°C-aligned target for agricultural production emissions as a 39% absolute reduction by 2050 relative to 2017 (Climate Action Tracker 2023). They note that, as global population and food demand are projected to continue growing through at least the year 2050, the emissions intensity of agricultural production per calorie of food produced will need to fall even faster than this 39% absolute target. Rapidly reducing the emissions intensity of livestock is therefore critical by 2030.

One way to reduce methane emissions from the digestive process of ruminant animals, such as cattle, sheep, and goats, is through the development of feed additives that lower emissions by interfering in the processes that generate methane. Feed additives that lower rumen methane production fit two classifications:

- Rumen modifiers that modify the rumen microbial ecosystem, with some resulting in <30% methane-reducing efficacy.
- Compounds that inhibit methane-producing enzymes reduce methane production by 30–95%, depending on type, dose, and duration of use (Cornell CALS 2024).

In the last five years, there has been significant progress in the development of methane inhibitors, including 3-nitrooxypropanol (3-NOP, trade name Bovaer®) made by DSM (dsm-firmenich), Agolin Ruminant (a blend of plant extracts), Mootral Ruminant (garlic and citrus extracts), SilvAir (a nitrate-based additive), and red seaweed extracts produced by CH_4 Global, Symbrosia, FutureFeed, Dulabio, and Volta Greentech.

BARRIERS TO UPTAKE OF METHANE INHIBITORS

Insufficient investment and global cross-sector collaboration in product development.

Current inappropriateness for extensive pasture-based systems.

Higher production costs when using methane inhibitors reduce incentives for adoption.

Limited collaboration on regulatory frameworks, sharing of data and metrics, reporting, and verification (MRV).

Insufficient information on meat and dairy consumers' willingness to pay.

CALL TO ACTION

A1. Increased international climate finance should be directed toward unlocking the potential of agricultural technologies and approaches with proven effectiveness

- Include methane inhibitors in Climate Bonds Initiative (CBI) Agriculture Criteria – under efforts to reduce GHG emissions, where the science has been proven – so that they are eligible for green finance. This in turn should be used to include methane inhibitors in country- and regional-level taxonomies, e.g., the EU taxonomy of permissible activities for green finance.
- Set emissions reduction targets for the methane inhibitor industry under the Science-based Target Initiatives (SbTI). This will further spur investments in this technology, as methane inhibitors enable emissions reductions.
- Seek and obtain international consensus on "repurposing" the more than US$600 billion spent annually by governments on agricultural support. Considering that much of the support provided to agriculture is market-distorting and incentivizes unsustainable production, public support should be reformed. One of the most promising shifts in such investments would be an increase in funding for R&D dedicated to productivity-enhancing and emissions-reducing technologies.

A2. Promote international sharing of knowledge on policy and implementation to facilitate faster uptake of proven technologies

- Countries should work together within Codex Alimentarius of the FAO-WHO to establish a food safety maximum residue limit of inhibitor compounds in livestock products. Such standards will help facilitate the trade of products containing inhibitors.
- Countries should take advantage of the existing Methane Pledge and incentivize demand creation globally for methane inhibitors and low-methane forages through specific technology use pledges and targets. These will be supported by financial incentives including carbon offsetting and national tax incentives to encourage producer uptake of technologies and consumer purchase of low-methane dairy and meat. As supply increases and the enabling environment improves, regulation forcing use of these emission-reducing technologies can be considered.
- Countries should take advantage of existing platforms such as the World Bank and FCDO facilitated Global Agriculture Policy Dialogues to engage with countries and private sector for exchanging best practices and barriers to higher adoption of feed additives.

A3. Develop common metrics and indicators to track the adoption of sustainable agricultural solutions

- Set up clear globally aligned regulatory frameworks and MRV requirements to ensure a fair playing field and credible GHG emission reporting to speed up scaling of methane inhibitors (feed supplements), which in the short term can deliver immediate and significant methane reductions in zero-grazing and grazing with feed supplementation livestock production systems. Further, we recommend collaboration among research institutions and international organizations (e.g. OECD, ISO) and the private sector and carbon market standards (e.g., Verra, Gold Standard, Plan Vivo) to develop and standardize cost-effective methodologies for evaluating standards for feed additives, across diverse socioeconomic and environmental contexts.
- Countries should come together and develop "Codex Planetarius" on the lines of Codex Alimentarius which develops internationally agreed food safety standards. 'Codex Planetarius' can set forth criteria for crops and animal-derived products (that is, end products for consumption) to be certified as compatible with international climate targets, which will then incentivise all actors in the value chain, such as fertilizer and livestock producers, to adopt low emissions and climate compatible technologies.

A4. Increase support for food system research, development, and demonstration to support the uptake and scaling of promising technologies and approaches

- Taking advantage of the active livestock research group of the Global Research Alliance on Agricultural Greenhouse Gases (GRA), invest in the continued research on methane-inhibiting technologies by documenting early success stories and increasing farmer options and market competition. GRA can also act as a global platform to centralize and facilitate greater sharing of data between public, commercial, scientific, and regulatory bodies for the development of standardized, science-based approaches to measuring product impacts, global standards, metrics, and accounting for methane reduction, including through the use of methane inhibitors.

A5. International efforts should work toward enabling the private sector to scale up solutions through global markets

- Revive moribund WTO Agreement on Environmental Goods & Services. Plurilateral negotiations for an Environmental Goods Agreement were started in 2014 to promote trade in essential environmental products, i.e., solar panels and wind turbines. In future negotiations, the list of green goods and services should include methane inhibitors. This would involve advocating for harmonized standards, certifications, and accounting methodologies with multilateral organizations such as WTO and various UN agencies.

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For more information see:

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