Media Backgrounder
Kaiseraugst, 29 April 2022

DSM Nutritional Products
Communications

Background information on Bovaer®, the feed additive that enables farmers to achieve consistent methane emission reductions by approximately 30% for dairy cows and even higher percentages (up to 90%) for beef cows

Royal DSM, a global science-based company active in Health, Nutrition and Biosciences, is making fast progress on bringing Bovaer® to the market. Bovaer® is a feed additive that enables farmers to consistently and conveniently reduce methane emissions from dairy, beef, and other ruminant herds. DSM works with authorities, scientific, and private partners from across the value chain and in multiple geographies on the application of Bovaer® in various farming systems, and the development of solutions to demonstrate the usage and measure the impact of Bovaer®. The latter will ensure that farmers and dairy companies can be recognized for the positive contribution they make.

Bovaer® is a first result of DSM's Project Clean Cow, a research and development journey of more than 10 years. The additive is the most extensively studied and scientifically proven solution to the challenge of enteric methane emissions to date. Over the past 10+ years, 48 on-farm beef and dairy trials across 14 countries and in various feeding systems have been conducted. These trials showed that Bovaer® can consistently achieve an enteric methane reduction of ~30%, with some trials demonstrating reductions as high as 90%. In addition, more than 50 peer-reviewed studies have fully clarified and proved its mode of action. In this way, Bovaer® is a firm proof-point of DSM's purpose-led, performance-driven strategy, building on DSM's other science-based, sustainable, and scalable solutions that respond to global challenges. Click here for an overview over the peer-reviewed studies.

How Bovaer® helps address climate change

Methane is a greenhouse gas that, like CO_2, contributes to climate change. It is short-lived, but 28 times more potent than CO_2. Ruminants (mainly cows) emit about 20% of all methane gasses globally: it is a natural byproduct of their digestion and is released into the atmosphere through burping. Reducing global methane emissions from cows will therefore have an immediate impact that can already help slow the pace of global warming in the next decade, facilitating longer-term action on CO_2 reduction.

Just a quarter teaspoon of Bovaer® per cow per day suppresses the enzyme that triggers methane production in a cow's rumen. The additive takes effect immediately and is safely broken down in the cow's normal digestive system into compounds already naturally present in the cow's stomach. As soon as it is no longer fed, full methane production resumes and there are no lasting effects in the cow. Bovaer® therefore helps significantly and immediately reduce the environmental footprint of meat, milk, and dairy products – key sources of high quality and affordable protein around the world. In this way, Bovaer® can significantly contribute to various UN Sustainable Development Goals, including Climate Action and to delivering on global and national climate ambitions, including the recently announced Global Methane Pledge (30% methane reduction by 2030 vs 2020) which over 100 countries signed onto.

The Global Methane Assessment by the Climate and Clean Air Coalition and the UN Environment Programme shows that drastically cutting methane emissions is one of the most effective and particularly

quickest ways to reduce global warming. Cutting methane emissions by 45% globally, could avoid 0.3 degrees of warming by 2045, according to the report.

Bovaer® market introduction

Across the globe, DSM is working with partners from the beef and dairy value chain to introduce Bovaer® into the market. These activities include large-scale pilots to further gain practical on-farm experience.

Currently, Bovaer® is available for sale in the EU, Switzerland, Brazil, Chile and Australia.

Europe:

In the EU, Bovaer® is the first ever approved feed additive with environmental impact, confirming its impact on methane emissions and its safety for animals, consumers and the environment.

In the Netherlands, FrieslandCampina will implement Bovaer® at 200 dairy farms in the second half of 2022. Providing the results are positive, the use of Bovaer® will be further upscaled from 2023. Earlier, DSM set up a trial at the Dairy Campus Leeuwarden in cooperation with a consortium from across the Dutch dairy value chain. The trial's aim was to gather all information necessary for Bovaer®'s accreditation by the Carbon Footprint Monitor/Climate Module of the Dutch "Kringloopwijzer" (Annual Nutrient Cycling Assessment). The results, published in January 2021, show a reduction in enteric methane emissions of 27-40% per cow, allowing Bovaer® to gain accreditation. The knowledge gained in the trial will be applicable across Europe, enabling DSM to advise farmers on the best application of Bovaer®, and governments and inventory organizations to adequately account for enteric methane reductions.

In Denmark, Sweden and Germany, Arla Foods is set to pilot the use of Bovaer® with 10,000 dairy cows across more than 50 farms. During the on-farm pilots, farmers will receive Bovaer® from their feed suppliers and mix it into the feed for their dairy cows. If preliminary findings are as expected, Arla Foods plans to double the pilot project to include 20.000 cows in 2023.

In Belgium, Danone has embraced Bovaer® as one of the solutions to realize carbon neutral Actimel in Belgium. The Flemish government financially supports farmers to use methane reducing feed, including Bovaer®.

In France and Slovakia, Bel Group started a pilot programme aiming to reduce methane emissions from dairy cows using Bovaer®.

In Finland, DSM has conducted trials with VALIO, Finland's largest global dairy cooperative company, to develop sustainable dairy products.

Latin America:

In Brazil and Chile, DSM has received full regulatory approval to commercialize Bovaer® covering beef, dairy, sheep and goats and DSM is now gradually scaling up its commercialisation activities and preparing its supply chain in both countries.

In November 2021, DSM signed a collaboration agreement with JBS to implement a development program with the goal of reducing enteric methane emissions from cattle on a global scale with Bovaer®.

Oceania:
In Australia, the North Australian Pastoral Company (NAPCo) will use Bovaer® for its flagship Net Zero beef product line: Five Founders, and throughout the NAPCo supply chain. NAPCo and DSM have signed a long-term collaboration and supply agreement for the use Bovaer®.

In Australia and New Zealand, DSM is working closely with industry and research institutes to develop a pasture-based application model for Bovaer®. Work conducted at AgResearch and CSIRO has successfully investigated several forms and feeding models for Bovaer® in different pasture-feeding systems common in New Zealand and Australia. DSM has also signed a collaboration agreement with Fonterra to accelerate the transition to lower-methane agriculture.

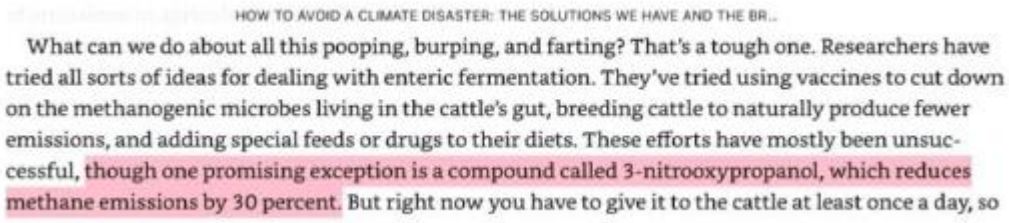
Production

At COP26 in Glasgow DSM announced that it is planning to realize large-scale production capacity for Bovaer® with a new plant at its existing site in Dalry, Scotland, supported by Scottish Enterprise.

In April 2022, DSM and Elanco announced a strategic alliance to develop, manufacture and commercialize Bovaer® in the United States for beef and dairy cattle.

Recognition

Bovaer® is also being recognized by research institutes and key opinion leaders as an exceptional solution to reduce methane in ruminants. For instance, it has recently been featured by the World Resources Institute (WRI) as one of the ten global break-through technologies that can help to feed the world sustainably. Next to this, in September, UC Davis published a whitepaper on methane's role in climate change, and how California's dairy industry can achieve climate neutrality. We are proud that UC Davis recognized Bovaer® as the only Category 1 solution (the only category of recommended interventions), with the highest potential impact pending FDA approval. We are also honored that Bill Gates mentions Bovaer® (3-NOP) in his new book, *How to Avoid a Climate Disaster*:


HOW TO AVOID A CLIMATE DISASTER: THE SOLUTIONS WE HAVE AND THE BR...

What can we do about all this pooping, burping, and farting? That's a tough one. Researchers have tried all sorts of ideas for dealing with enteric fermentation. They've tried using vaccines to cut down on the methanogenic microbes living in the cattle's gut, breeding cattle to naturally produce fewer emissions, and adding special feeds or drugs to their diets. These efforts have mostly been unsuccessful, though one promising exception is a compound called 3-nitrooxypropanol, which reduces methane emissions by 30 percent. But right now you have to give it to the cattle at least once a day, so

Registration

In Latin America, DSM has received full regulatory approval from the Brazilian and Chilean authorities to commercialize Bovaer® for application in beef, dairy, sheep and goats.

In Europe, DSM has received a positive EFSA opinion (confirming that Bovaer® is efficacious to reduce enteric methane emissions from dairy cows and is safe for the animal and the consumer) and has been approved by the EU member states for dairy cows in the EU. Moreover, Bovaer® has been approved for use in dairy cows in Switzerland.

In Oceania, Bovaer® is available for use in beef and dairy in Australia.

Registrations of the feed additive in other regions will follow.

About DSM

Royal DSM is a global, purpose-led company in Health, Nutrition & Bioscience, applying science to improve the health of people, animals and the planet. DSM's purpose is to create brighter lives for all. DSM's products and solutions address some of the world's biggest challenges while simultaneously creating economic, environmental and societal value for all its stakeholders – customers, employees, shareholders, and society at large. The company was founded in 1902 and is listed on Euronext Amsterdam. More information can be found at www.dsm.com.