Use of Bovaer® in dairy cows (methane emissions)

Last update: 2 June 2023

- **Type of challenge**: Environment.
- **Challenge**: Climate change (enteric methane emissions).
- **Action**: Reduction of enteric methane emission.
- **Animal category**: Lactating dairy cows and reproductive cows.
- **Technique**: Use of Bovaer® (3- nitrooxypropanol 3-NOP) as feed additive (Regulation (EU) 2022/565).
- **Mode of action**: Blocks the last step of methanogenesis in the rumen by temporarily oxidizing the Ni-cofactor in the enzyme methyl-coenzyme M reductase; this reduces the generation of methane in the rumen and emissions in the environment.
- **Potential efficacy:** On average a reduction of 30% enteric methane emission (emission of methane per day, per kg DM intake and per kg milk); individual farm reductions can be calculated based on the farm ration information using the methane reduction formula published in (Kebreab *et al*. (2022)).
- **Nature of evidence of efficacy**: EFSA Scientific Opinion on the safety and efficacy of a feed additive consisting of 3-nitrooxypropanol; peer reviewed scientific publication (meta-analysis).
- **Factors impacting on efficacy**: Proportion of forages vs. concentrate; quality of the forage (NDF%); percentage of fat.
- **Mode of use:** Mixed into mineral feed, mash feed or concentrate feed at dosage equivalent to 60 mg Bovaer® (3-NOP)/kg total Dry Matter Intake; delivered all day long.
- **Requirements / limitations**: The animals must have access to the feed containing the additive throughout the day; techniques under development to allow for access to grazing animals; only the additive delivered by the holder of the authorization may be used; the substance must be added in a mixture by a registered feed business operator applying HACCP (Regulation (EC) No 183/2005); a maximum limit of 80 mg Bovaer® (3-NOP)/kg total Dry Matter may not be exceeded; not authorised in organic production systems; not authorized yet for ruminants other than lactating dairy cows and reproductive cows.
- **Economic consequences**: Higher feeding cost.
- **Side effects**: No impact on zootechnical performance identified.
- **References**:

  - EFSA (2021). *Scientific Opinion on the safety and efficacy of a feed additive consisting of 3-nitrooxypropanol*. EFSA Journal 2021;19(11):6905, 35 pp. https://doi.org/10.2903/j.efsa.2021.6905

- Ermias Kebreab *et al* (2022). *A meta-analysis of effects of 3-nitrooxypropanol on methane production, yield, and intensity in dairy cattle*. J. Dairy Sci. 106:927–936. https://doi.org/10.3168/jds.2022-22211 Arndt *et al* (2022). Full adoption of the most effective strategies to mitigate methane emissions by ruminants can help meet the 1.5 °C target by 2030 but not 2050. PNAS May 10, 2022. https://doi.org/10.1073/pnas.2111294119
- Hegarty RS *et al*. (2021). *An evaluation of emerging feed additives to reduce methane emissions from livestock*. Edition 1. A report coordinated by Climate Change, Agriculture and Food Security (CCAFS) and the New Zealand Agricultural Greenhouse Gas Research Centre (NZAGRC) - initiative of the Global Research Alliance (GRA)..
- D. Van Wesemael *et al* (2018). *Reducing enteric methane emissions from dairy cattle: Two ways to supplement 3-nitrooxypropanol*. J. Dairy Sci. 102:1780–1787. https://doi.org/10.3168/jds.2018-14534
- FAO (2023). *FAO LEAP guidelines on Methane emissions in livestock and rice systems: Sources, quantification, mitigation and metrics*.
- Covenant Enteric Emissions Cattle – Measure 9: 3-NOP

- **Other techniques**: Unsaturated fat sources (linseed, rapeseed fats); electron sink (nitrate); methane inhibitors (Asparagopsis taxiformis, tanniferous forages); shift in rumen fermentation pattern (tannins, high digestible forages, probiotics, organic acids, essential oils, decreasing forage-to-concentrate ratio); lower emission intensity (increasing feeding level, increasing feed efficiency, decreasing grass maturity).

Charter Ambitions: 1, 5