

List of Publications, d.d. January 9 2023

List of Publications in peer-reviewed journals concerning the results of Bovaer/3-NOP including the animal trials (dairy cows, beef cattle and sheep)

So far, all results including the animal trials within the project CleanCow have been published in peer-reviewed scientific journals. This leads to a transparent development history of the methane inhibitor 3-NOP to the public.

1. Lupwayi, N. Z.; Hao, X.; Thomas, B. W.; Stoeckli, J.; Mesina, L.; Polo, R. O. Alteration of the Soil Microbiome and Enzyme Activities by Forage-Applied Manure from Cattle Fed the Methane Inhibitor 3-Nitrooxypropanol Supplement. *Appl. Soil Ecol.* **2023**, *183*, 104765. <https://doi.org/10.1016/j.apsoil.2022.104765>.
2. Alemu, A. W.; Robert, G.; Zhang, X. M.; Eóin, O.; Kindermann, M.; Beauchemin, K. A. 3-Nitrooxypropanol Supplementation of a Forage Diet Decreased Enteric Methane Emissions from Beef Cattle without Affecting Feed Intake and Apparent Total-Tract Digestibility. *Journal of Animal Science* **2023**, accepted for publication. <https://doi.org/10.1093/jas/skad001>.
3. Uddin, M. E.; Tricarico, J. M.; Kebreab, E. Impact of Nitrate and 3-Nitrooxypropanol on the Carbon Footprints of Milk from Cattle Produced in Confined-Feeding Systems across Regions in the United States: A Life Cycle Analysis. *J. Dairy Sci.* **2022**, *105* (6), 5074–5083. <https://doi.org/10.3168/jds.2021-20988>.
4. Schilde, M.; von Soosten, D.; Frahm, J.; Kersten, S.; Meyer, U.; Zeyner, A.; Dänicke, S. Assessment of Metabolic Adaptations in Periparturient Dairy Cows Provided 3-Nitrooxypropanol and Varying Concentrate Proportions by Using the GreenFeed System for Indirect Calorimetry, Biochemical Blood Parameters and Ultrasonography of Adipose Tissues. *Dairy* **2022**, *3* (1), 100–122. <https://doi.org/10.3390/dairy3010009>.
5. Pitta, D. W.; Indugu, N.; Melgar, A.; Hristov, A.; Challa, K.; Vecchiarelli, B.; Hennessy, M.; Narayan, K.; Duval, S.; Kindermann, M.; Walker, N. The Effect of 3-Nitrooxypropanol, a Potent Methane Inhibitor, on Ruminal Microbial Gene Expression Profiles in Dairy Cows. *Microbiome* **2022**, *10* (1), 146. <https://doi.org/10.1186/s40168-022-01341-9>.
6. Kebreab, E.; Bannink, A.; Pressman, E. M.; Walker, N.; Karagiannis, A.; Gastelen, S. van; Dijkstra, J. A Meta-Analysis of Effects of 3-Nitrooxypropanol on Methane Production, Yield, and Intensity in Dairy Cattle. *J. Dairy Sci.* **2022**, *0* (0). <https://doi.org/10.3168/jds.2022-22211>.
7. Gastelen, S. van; Dijkstra, J.; Heck, J. M. L.; Kindermann, M.; Klop, A.; Mol, R. de; Rijnders, D.; Walker, N.; Bannink, A. Methane Mitigation Potential of 3-

- Nitrooxypropanol in Lactating Cows Is Influenced by Basal Diet Composition. *J. Dairy Sci.* **2022**, *105* (5), 4064–4082. <https://doi.org/10.3168/jds.2021-20782>.
8. Fouts, J. Q.; Honan, M. C.; Roque, B. M.; Tricarico, J. M.; Kebreab, E. Enteric Methane Mitigation Interventions. *Trans. Anim. Sci.* **2022**, *6* (2), txac041. <https://doi.org/10.1093/tas/txac041>.
 9. Beauchemin, K. A.; Ungerfeld, E. M.; Abdalla, A. L.; Alvarez, C.; Arndt, C.; Becquet, P.; Benchaar, C.; Berndt, A.; Mauricio, R. M.; McAllister, T. A.; Oyhantçabal, W.; Salami, S. A.; Shalloo, L.; Sun, Y.; Tricarico, J.; Uwizeye, A.; De Camillis, C.; Bernoux, M.; Robinson, T.; Kebreab, E. Invited Review: Current Enteric Methane Mitigation Options. *J. Dairy Sci.* **2022**, *105* (12), 9297–9326. <https://doi.org/10.3168/jds.2022-22091>.
 10. Arndt, C.; Hristov, A. N.; Price, W. J.; McClelland, S. C.; Pelaez, A. M.; Cueva, S. F.; Oh, J.; Dijkstra, J.; Bannink, A.; Bayat, A. R.; Crompton, L. A.; Eugène, M. A.; Enahoro, D.; Kebreab, E.; Kreuzer, M.; McGee, M.; Martin, C.; Newbold, C. J.; Reynolds, C. K.; Schwarm, A.; Shingfield, K. J.; Veneman, J. B.; Yáñez-Ruiz, D. R.; Yu, Z. 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. *Proc. Natl. Acad. Sci. U.S.A.* **2022**, *119* (20), e2111294119. <https://doi.org/10.1073/pnas.2111294119>.
 11. Yu, G.; Beauchemin, K. A.; Dong, R. A Review of 3-Nitrooxypropanol for Enteric Methane Mitigation from Ruminant Livestock. *Animals* **2021**, *11* (12), 3540. <https://doi.org/10.3390/ani11123540>.
 12. Weber, T. L.; Hao, X.; Gross, C. D.; Beauchemin, K. A.; Chang, S. X. Effect of Manure from Cattle Fed 3-Nitrooxypropanol on Anthropogenic Greenhouse Gas Emissions Depends on Soil Type. *Agronomy* **2021**, *11* (2), 371. <https://doi.org/10.3390/agronomy11020371>.
 13. van Lingen, H. J.; Fadel, J. G.; Yáñez-Ruiz, D. R.; Kindermann, M.; Kebreab, E. Inhibited Methanogenesis in the Rumen of Cattle: Microbial Metabolism in Response to Supplemental 3-Nitrooxypropanol and Nitrate. *Front. Microbiol.* **2021**, *12*, 705613. <https://doi.org/10.3389/fmicb.2021.705613>.
 14. Schilde, M.; von Soosten, D.; Hüther, L.; Meyer, U.; Zeyner, A.; Dänicke, S. Effects of 3-Nitrooxypropanol and Varying Concentrate Feed Proportions in the Ration on Methane Emission, Rumen Fermentation and Performance of Periparturient Dairy Cows. *Arch. Anim. Nutr.* **2021**, *75* (2), 79–104. <https://doi.org/10.1080/1745039X.2021.1877986>.
 15. Pitta, D. W.; Melgar, A.; Hristov, A. N.; Indugu, N.; Narayan, K. S.; Pappalardo, C.; Hennessy, M. L.; Vecchiarelli, B.; Kaplan-Shabtai, V.; Kindermann, M.; Walker, N. Temporal Changes in Total and Metabolically Active Ruminal Methanogens in Dairy Cows Supplemented with 3-Nitrooxypropanol. *J. Dairy Sci.* **2021**, *104* (8), 8721–8735. <https://doi.org/10.3168/jds.2020-19862>.

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17. Melgar, A.; Lage, C. F. A.; Nedelkov, K.; Räisänen, S. E.; Stefenoni, H.; Fetter, M. E.; Chen, X.; Oh, J.; Duval, S.; Kindermann, M.; Walker, N. D.; Hristov, A. N. Enteric Methane Emission, Milk Production, and Composition of Dairy Cows Fed 3-Nitrooxypropanol. *J. Dairy Sci.* **2021**, *104* (1), 357–366. <https://doi.org/10.3168/jds.2020-18908>.
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20. Ermias Kebreab; Xiaoyu Feng. Strategies to Reduce Methane Emissions from Enteric and Lagoon Sources." Contract 17RD018 (2021): 57., 2021. <https://ww2.arb.ca.gov/sites/default/files/2020-12/17RD018.pdf>.
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