



GLOBAL
RESEARCH
ALLIANCE

ON AGRICULTURAL GREENHOUSE GASES

Feed and Nutrition Network (FNN)



David Yanez-Ruiz -Andre Bannink/Alex Hristov

2023 Livestock Research Group Meeting Lyon, France

Objectives

1. Summarise and evaluate the available data on mitigating GHG emissions of ruminants by nutritional means
2. Develop sound recommendations on methane mitigation by nutritional means for stakeholders
3. Identify gaps in knowledge and focus research on priority issues - PROJECTS

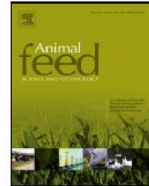
FNN Activities/outcomes



Contents lists available at [ScienceDirect](#)

Animal Feed Science and Technology

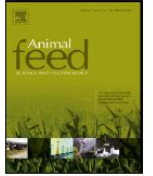
journal homepage: www.elsevier.com/locate/anifeedsci



Contents lists available at [ScienceDirect](#)

Animal Feed Science and Technology

journal homepage: www.elsevier.com/locate/anifeedsci



Review article

Review of current *in vivo* measurement techniques for quantifying enteric methane emission from ruminants



Review article

Design, implementation and interpretation of *in vitro* batch culture experiments to assess enteric methane mitigation in ruminants—a review



J. Dairy Sci. 101:6655–6674

<https://doi.org/10.3168/jds.2017-13536>

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Contents lists available at [ScienceDirect](#)

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv



Review

Challenges and opportunities to capture dietary effects in on-farm greenhouse gas emissions models of ruminant systems



Symposium review: Uncertainties in enteric methane inventories, measurement techniques, and prediction models¹

A. N. Hristov,^{x2} E. Kebreab,[†] M. Niu,[†] J. Oh,^{*} A. Bannink,[‡] A. R. Bayat,[§] T. M. Boland,[#] A. F. E. D. P. Casper,[¶] L. A. Crompton,^{\$} J. Dijkstra,[€] M. Eugène,[¥] P. C. Garnsworthy,^{**} N. Haque,[†] A. L. F. Hellwing,^{‡‡} P. Huhtanen,^{§§} M. Kreuzer,^{##} B. Kuhla,^{|||} P. Lund,^{‡‡} J. Madsen,^{††} C. I. P. J. Moate,^{¶¶} S. Muetzel,^{\$\$} C. Muñoz,^{€€} N. Peiren,^{¥¥} J. M. Powell,^{***} C. K. Reynolds,^{\$} A. K. J. Shingfield,^{†††} T. M. Storlien,^{‡‡‡} M. R. Weisbjerg,^{‡‡} D. R. Yáñez-Ruiz,^{§§§} and Z. Yu[†]

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Invited review: Nitrogen in ruminant nutrition: A review of measurement techniques

A. N. Hristov,^{1*} A. Bannink,² L. A. Crompton,³ P. Huhtanen,⁴ M. Kreuzer,⁵ M. Mc C. K. Reynolds,³ A. R. Bayat,⁸ D. R. Yáñez-Ruiz,⁹ J. Dijkstra,¹⁰ E. Kebreab,¹¹ A. K. J. Shingfield,^{8,12,†} and Z. Yu¹³



Contents lists available at [ScienceDirect](#)

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv



Review

Modelling the effect of feeding management on greenhouse gas and nitrogen emissions in cattle farming systems



Latifa Ouatahar^{a,b,*}, André Bannink^c, Gary Lanigan^d, Barbara Amon^{b,e}

FNN Activities/outcomes

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PNAS

RESEARCH ARTICLE

SUSTAINABILITY SCIENCE

OPEN ACCESS



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

Claudia Arndt^{a,1}, Alexander N. Hristov^b, William J. Price^c, Shelby C. McClelland^d, Amalia M. Pelaez^{b,e}, Sergio F. Cueva^b, Joonpyo Oh^b, Jan Dijkstra^e, André Bannink^e, Ali R. Bayat^f, Les A. Crompton^g, Maguy A. Eugène^h, Dolapo Enahoro^a, Ermias Kebreabⁱ, Michael Kreuzer^j, Mark McGee^k, Cécile Martin^h, Charles J. Newbold^l, Christopher K. Reynolds^g, Angela Schwarm^m, Kevin J. Shingfield^{f,2}

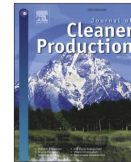
Journal of Cleaner Production 384 (2023) 135523



Contents lists available at ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro



Prediction of enteric methane emissions by sheep using an intercontinental database

Alejandro Belanche^{a,b,*}, Alexander N. Hristov^c, Henk J. van Lingen^d, Stuart E. Denman^e, Ermias Kebreab^f, Angela Schwarm^g, Michael Kreuzer^h, Mutian Niu^h, Maguy Eugèneⁱ, Vincent Niderkornⁱ, Cécile Martinⁱ, Harry Archimède^j, Mark McGee^k, Christopher K. Reynolds^l, Les A. Crompton^l, Ali Reza Bayat^m, Zhongtang Yuⁿ, André Bannink^o, Jan Dijkstra^p, Alex V. Chaves^q, Harry Clark^r, Stefan Muetzel^s, Vibeke Lind^t, Jon M. Moorby^u, John A. Rooke^v, Aurélie Aubry^w, Walter Antezana^x, Min Wang^y, Roger Hegarty^z, V. Hutton Oddy^{aa}, Julian Hill^{ab}, Philip E. Vercoe^{ac,ad}, Jean Víctor Savian^{ae}, Adibe Luiz Abdalla^{af}, Yosra A. Soltan^{ag}, Alda Lúcia Gomes Monteiro^{ah}, Juan Carlos Ku-Vera^{ai}, Gustavo Jaurena^{aj}, Carlos A. Gómez-Bravo^{ak}, Olga L. Mayorga^{al}, Guilherme F.S. Congio^{am}, David R. Yáñez-Ruiz^{a,**}

LATIN AMERICA METHANE PROJECT COLLABORATORS, ALEXANDER NIKOLOV Hristov^{d,**}



Science of The Total Environment

Volume 825, 15 June 2022, 153982

Prediction of enteric methane production and yield in dairy cattle using a Latin America and Caribbean database

Guilherme F.S. Congio^a, André Bannink^b, Olga L. Mayorga^c, João P.P. Rodrigues^d, Adeline Bougouin^e, Ermias Kebreab^e, Ricardo R. Silva^f, Rogério M. Maurício^g, Sila C. da Silva^a, Patrícia P.A. Oliveira^h, Camila Muñoz-Luiz G.R. Pereira^j, Carlos Gómez^k, Claudia Ariza-Nieto^c, Henrique M.N. Ribeiro-Filho^l, Octavio A. Castelán-Ortega^m, Jaime R. Rosero-Nogueraⁿ, Maria P. Tieri^{o,p} ... Alexander N. Hristov^u

CEDERS / FNN workshop



CEDERS
2017-2021

13.30 – 15.00 **CEDERS**

CEDERS Intro, André Bannink
CEDERS WP1, Maguy Eugene
CEDERS WP2, Pekka Huhtanen
CEDERS WP3, Gary Lanigan
CEDERS WP4, André Bannink
CIRAD, Mohamed Habibou Assouma

15.00 – 15.30 **break**

15.30 – 16.30

- Intro FNN, André Bannink (previous chair)
 - **GRA-Feed Additives flagship**, David Yanez-Ruiz
 - **ERANET - INTEGRITY** project, Patricia Ricci
 - Future Treatment Means Database, Alex Hristov
 - SE-Asian methane project, Tuan Poy Tee
 - GRA-RMG Flagship, Sharon Huws
- Closure, new chair David Yanez-Ruiz

16.30 – 17.30 **Social**

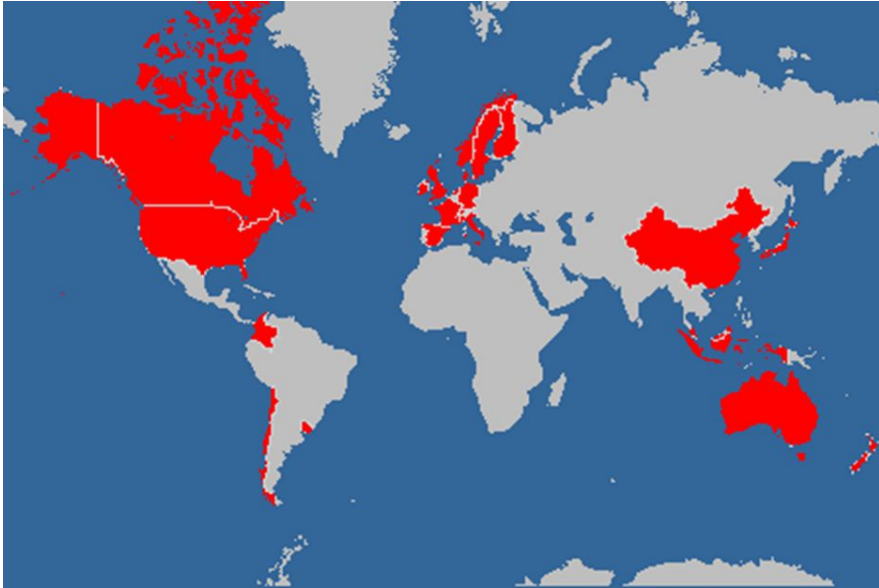
**FEED & NUTRITION
NETWORK**

- 2 on line workshops to discuss elements to include in the flagship project on FEED ADDITIIVES

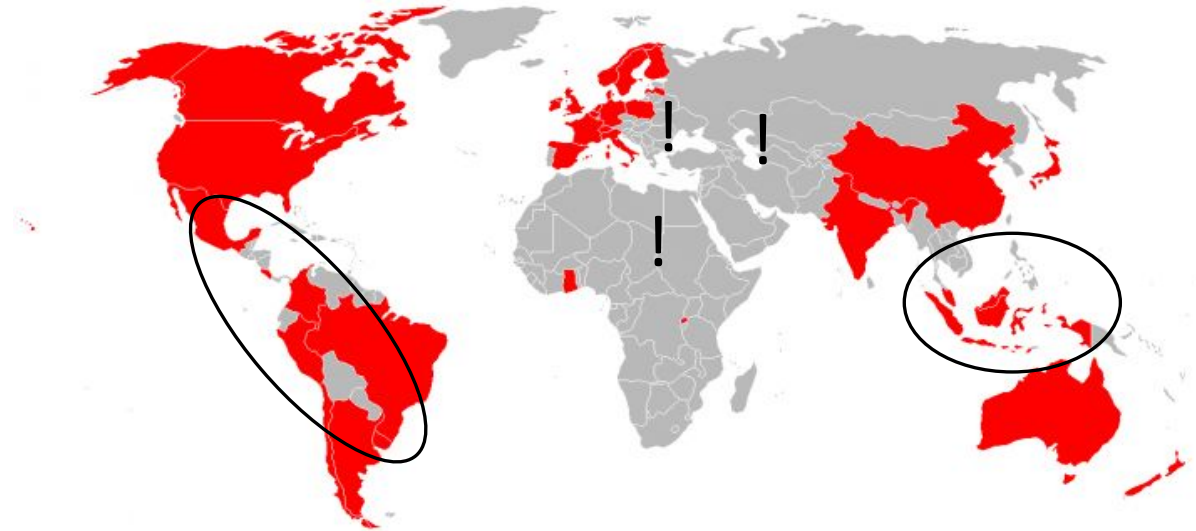
- Projects (**Global Network** 2014-2017; **CEDERS** 2017-2021; **Integrity** 2022-2026)
- Latin American/Caribbean and SouthEast Asian projects
- GRA **flagship** on **FEED ADDITIVES** 2022-2024
- Africa / Eastern Europe / Middle East?

Countries represented in FNN

2014



Since 2020 Enteric Methane Flagships for
Latin-America/Caribbean & SouthEast Asia



- New colleagues joined since June 2022 = 20 from 7 countries (Argentina, Chile, Belgium, Australia, UK, Switzerland and Spain)

- 2023 annual Workshop – November 2023 – focus on African projects (Claudia Arndt – ILRI)
- Bimonthly list of papers published by the groups in the network

Thank you

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