GLOBAL RESEARCH ALLIANCE

ON AGRICULTURAL GREENHOUSE GASES

•The role of GRA in accelerating GHG mitigation, capacity building and leveraging co-benefits

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Special Representative
5 June 2022

GLOBAL RESEARCH ALLIANCE
ON AGRICULTURAL GREENHOUSE GASES

AT A GLANCE

66 member countries

4 Research Groups

- Paddy Rice Research Group
- Livestock Research Group
- Croplands Research Group
- Integrative Research Group

17 Science Networks

24 partner organisations

Over **3000** scientists involved in activities of the GRA

72 international collaborative projects supporting the GRA

172 fellowships awarded to recipients from **45** countries

40 technical training workshops held

23 technical guidelines, resource materials and databases produced








Livestock Research Group

Linking global science and building global science capacity to reduce the emission intensity of livestock production systems and increasing the quantity of carbon stored in soils supporting these systems

Networks

- **Animal Health**
- **Animal Selection, Genetics and Genomics**
- **Feed and Nutrition**
- **Manure Management**
- **Rumen Microbial Genomics**

www.lrg2020.com

www.livestockresearchgroup.com

Searching for the silver bullet within nature's diversity

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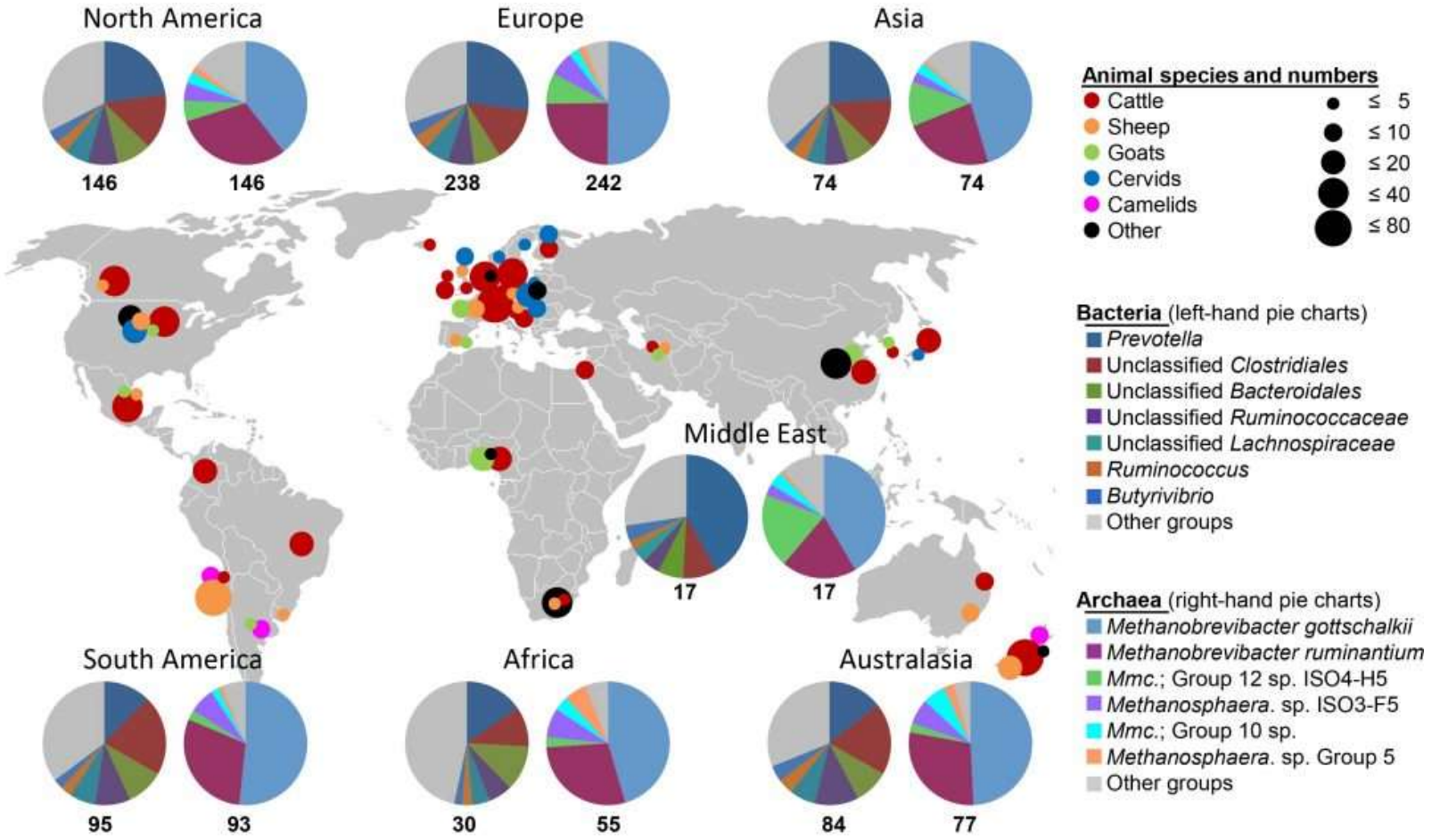
Global solutions to reduce methane from ruminant animals are feasible because the microbes causing the emissions are similar around the world



140 scientists from **73 organisations** in **35 countries** contributed to the rumen census, with microbial samples collected over two years.

Global Rumen Census

RMG NETWORK
RUMEN MICROBIAL GENOMICS NETWORK

You can’t mitigate what you can’t measure

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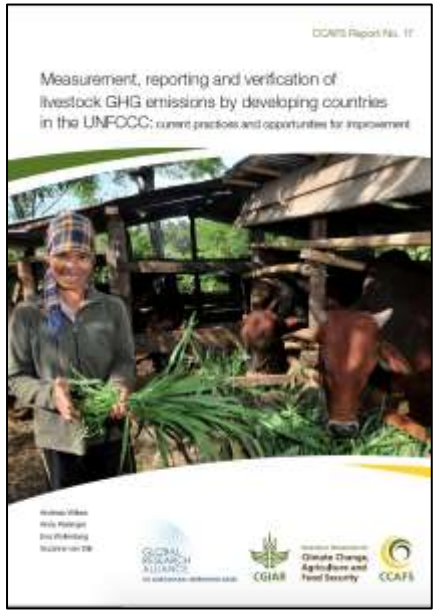

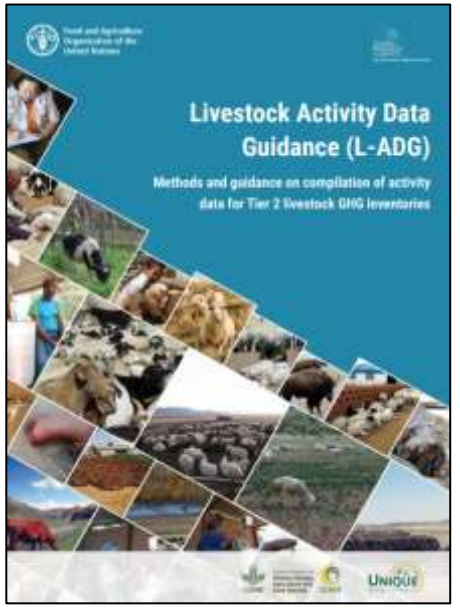

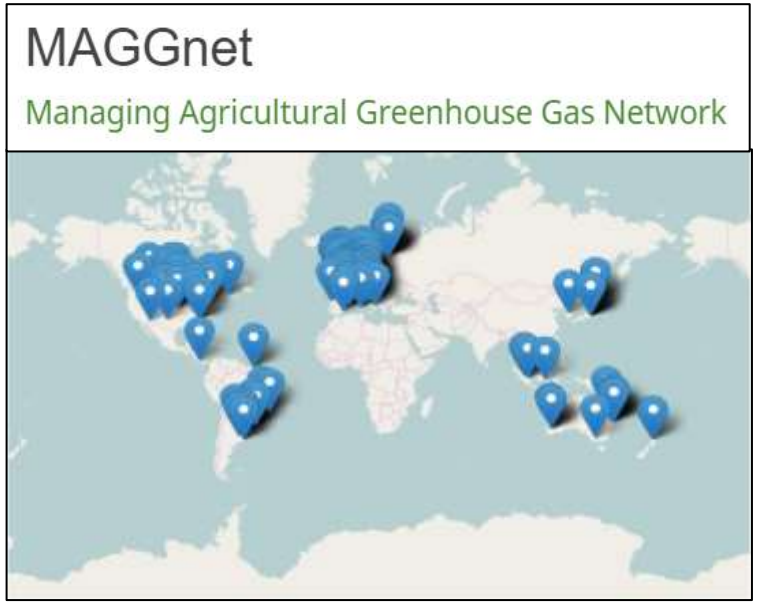

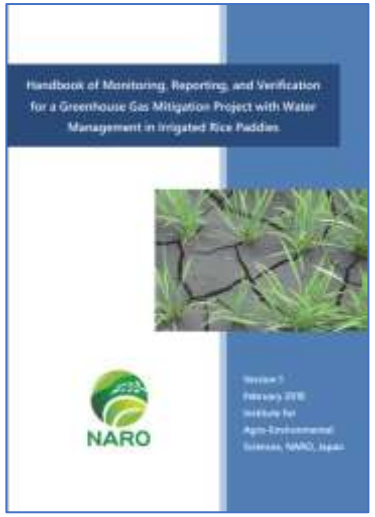

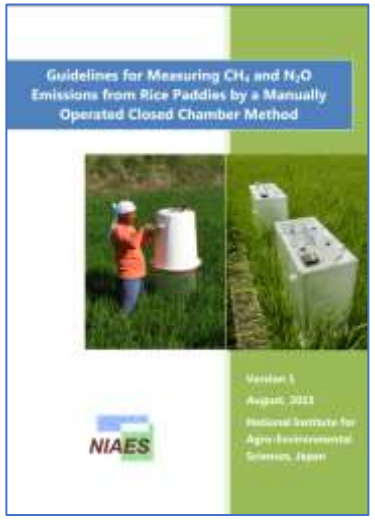

Since 2012, MAGGnet has compiled metadata from over 337 experimental studies from 23 countries.

Best practice and emerging options

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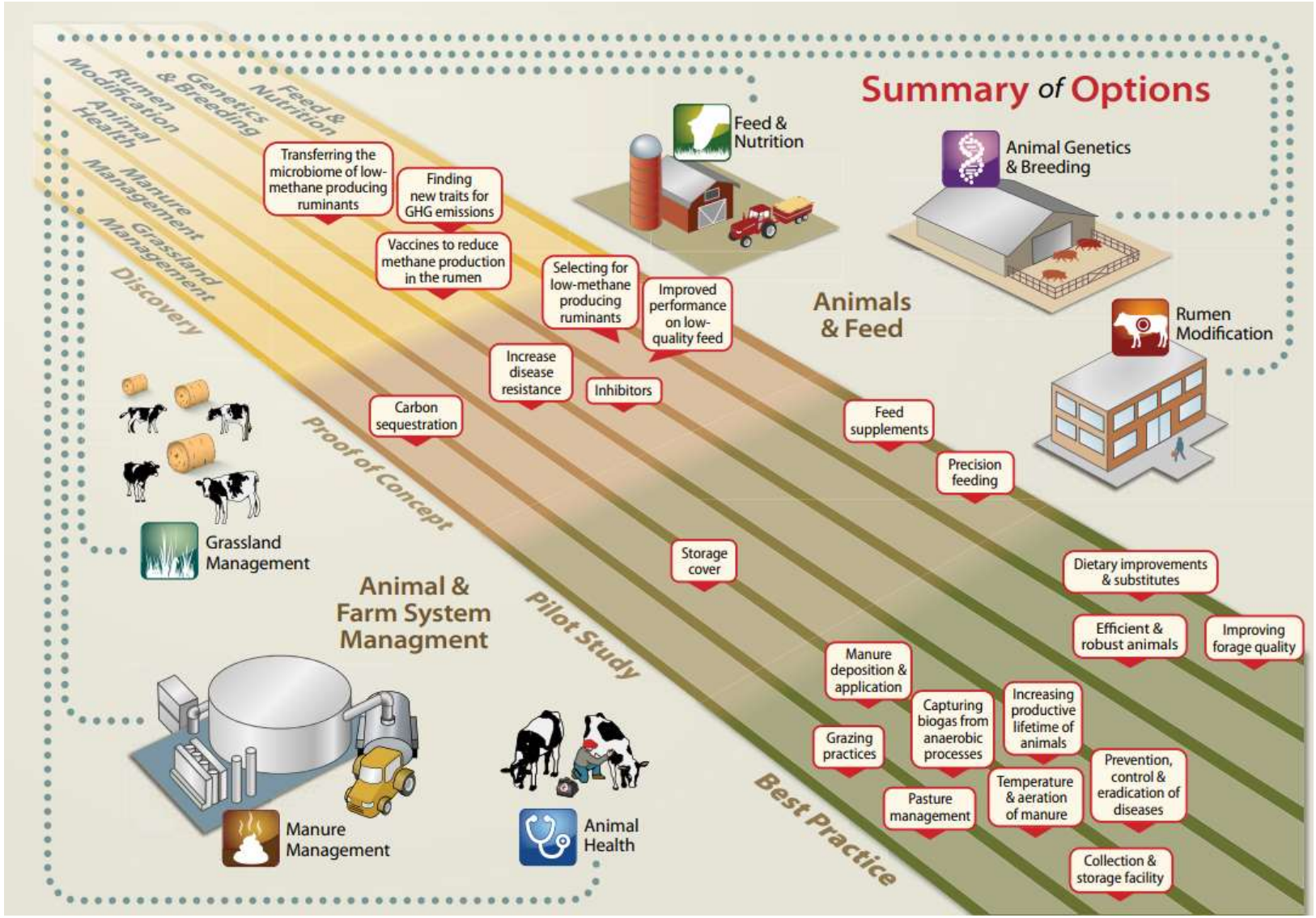

https://globalresearchalliance.org/wp-content/uploads/2018/02/LRG-SAI-Best-Practice-Guidelines-2014.pdf

Improved animal health as a means to increase productivity…and reduce GHG

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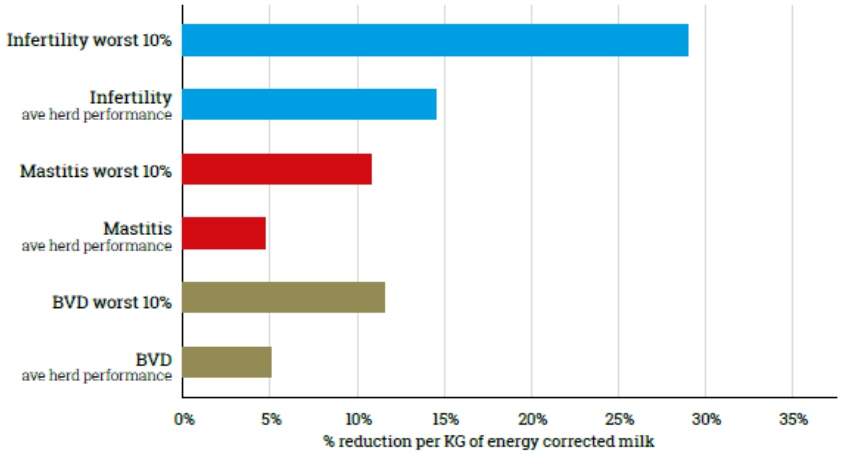
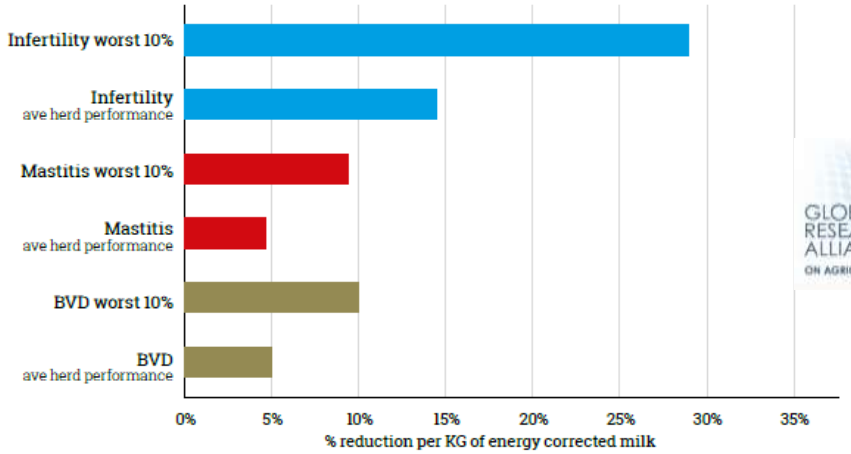
Potential reductions in GHG intensity of milk production in the UK



Potential reductions in GHG intensity of milk production in Chile



Comparative study in Chile, Kenya and UK

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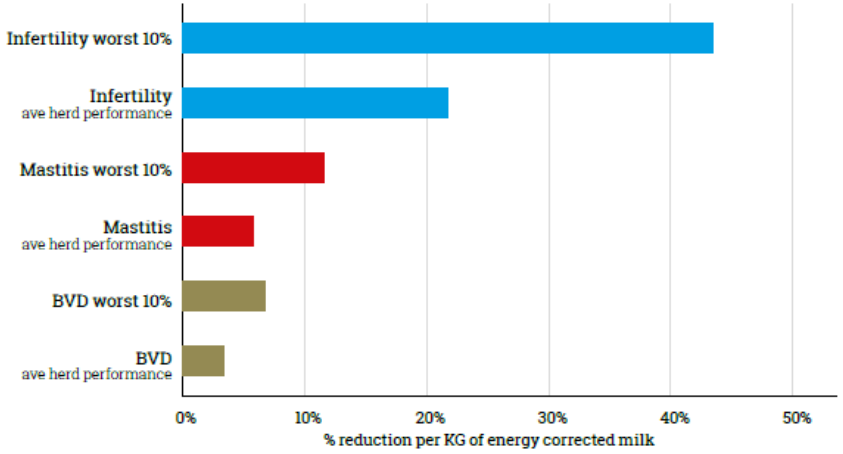
GLOBAL DAIRY PLATFORM

dsf Dairy Sustainability Framework

Potential reductions in GHG intensity of milk production in Kenya



Cattle health potential for reducing GHG intensity

The data are for three conditions with the average herd level potential for each and the potential for the worst 10% of herds.

Condition	Potential reductions in GHG intensity		
	UK	Chile	Kenya
BVD	5%	5%	3%
BVD worst 10%	12%	10%	7%
Mastitis	5%	5%	6%
Mastitis worst 10%	11%	9%	11%
Infertility	14%	14%	22%
Infertility worst 10%	29%	29%	43%

Economics

The range in costs and benefits across the three geographies*.

AHIM	Action – Cost range in the 3 Geographies - $US	Benefit $US
Fertility –Reducing CI by 10 days	2-15/cow/year	20-25/cow/year
BVD	2-6/cow/year	Circa 68/cow/year
Mastitis	4-12/cow/year	200-670/case/cow/year

* Further detail on the economics is provided in the report.

WORKING WITH THE SECTOR

Global Research Alliance on Agricultural Greenhouse Gases is a knowledge partner of the Pathways to Dairy Net Zero initiative.

- ✔ Undertaking a review of current and prospective mitigation options for the global dairy sector.
- ✔ Developing a new dairy systems classification.
- ✔ Modelling a range of scenarios to 2050 in order to demonstrate plausible mitigation pathways, applicable to different dairy systems.

Builds on a considerable body of work that has already been conducted using FAO's GLEAM model, as well as drawing on research and other knowledge from dairy sector exp member countries.

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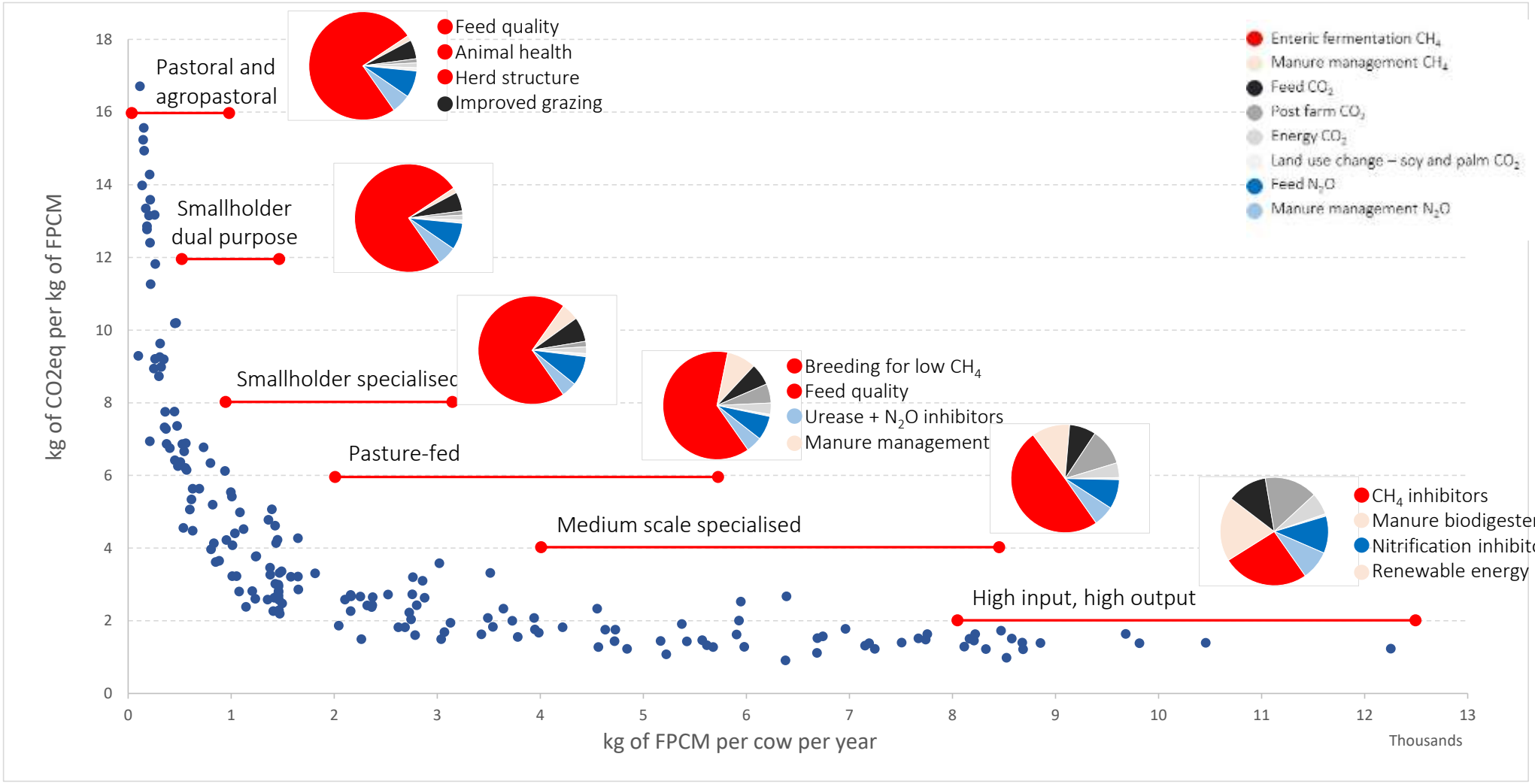
NEW ZEALAND AGRICULTURAL GREENHOUSE GAS Research Centre

SRUC

Source: GLEAM 3, unpublished 2015 data



CLIFF-GRADS

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Purpose

- Support PhD students from developing countries to conduct research on climate change mitigation in agriculture and quantification of agricultural greenhouse gases
- Foster a network of young professionals
- Improve data on mitigation and emissions to reduce the impact of agriculture on the climate

So far:

- four rounds
- 124 PhD students
- from 32 countries
- based in 50 different institutes
- from 30 different countries.

CGIAR RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security CCAFS

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Benefits:

- Early career scientist capability
- New institutional links
- Alumni networks
- Strengthened GRA membership
- New research ideas

Ryan Institute NUI Galway OÉ Gaillimh

AARHUS UNIVERSITET

Angelinus Franke	University of the Free State	South Africa	Can pastoral grazing systems contribute to climate change mitigation? Gathering evidence and exploring future scenario's in the Grassland Biome of South Africa
Frank Masese	University of Eldoret	Kenya	Greenhouse Gas Emissions, Soil Carbon Stocks and Livestock Watering Points in Agropastoral Rangelands of Taita Taveta Hills, Kenya (GRESOL)
Dossa Luc Hippolyte	University of Abomey Calavi	Benin	Relationship between cattle voluntary feed intake on pasture and enteric methane emission in the Sudanian zone of West Africa
Mwanjalolo J.G. Majaliwa	Makerere University	Uganda	Effects of changes in Land Use/Cover and Climate on Carbon Stocks in selected Agro-Ecological Zones of Uganda
Constantine Katongole	Makerere University	Uganda	Developing equations for predicting feed intake by pastoral/agro-pastoral livestock: tackling uncertainty in Uganda's national enteric methane emissions inventory
Isa Kabenge	Makerere University	Uganda	Machine learning for estimating sources and sinks: Developing cloud computing-based, artificially intelligent algorithms to quantify livestock and biomass for management of GHG emissions
Ciza Azine	Evangelical University in Africa	DR-Congo	Amélioration de la productivité animale par la valorisation des ressources alimentaires locales au Sud Kivu, Est de la République Démocratique du Congo.
Caroline Wambui	Maseno University	Kenya	Capacity building for mitigation of GHG emissions and improved ruminant productivity through efficient feeding and manure management strategies in agro-pastoral systems

GRA Flagships

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GRA Flagship Projects develop new knowledge to better understand agricultural greenhouse gases, have global relevance and applicability and generate high scientific impact.

FOR MORE INFORMATION

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Hayden Montgomery
Agriculture Programme Director
Global Methane Hub

GLOBAL METHANE HUB

Leading Philanthropic Organizations Partner and Commit to Over $328M to Reducing Methane Emissions

October 11, 2021

SHARE

GLOBAL METHANE HUB

Our Partners

- The Hub will focus on the energy, agricultural, and waste sectors which account for 96% of human-caused methane emissions.
- We will support ambitious catalytic investments, lay the groundwork for long-term transformation of challenging sectors, and also deliver quick wins in sectors that are ripe for action on the ground.
- Our vision is to collaborate with governmental and non-governmental entities to scale up cost-effective solutions in methane mitigation and contribute to transformational change.

GLOBAL METHANE HUB

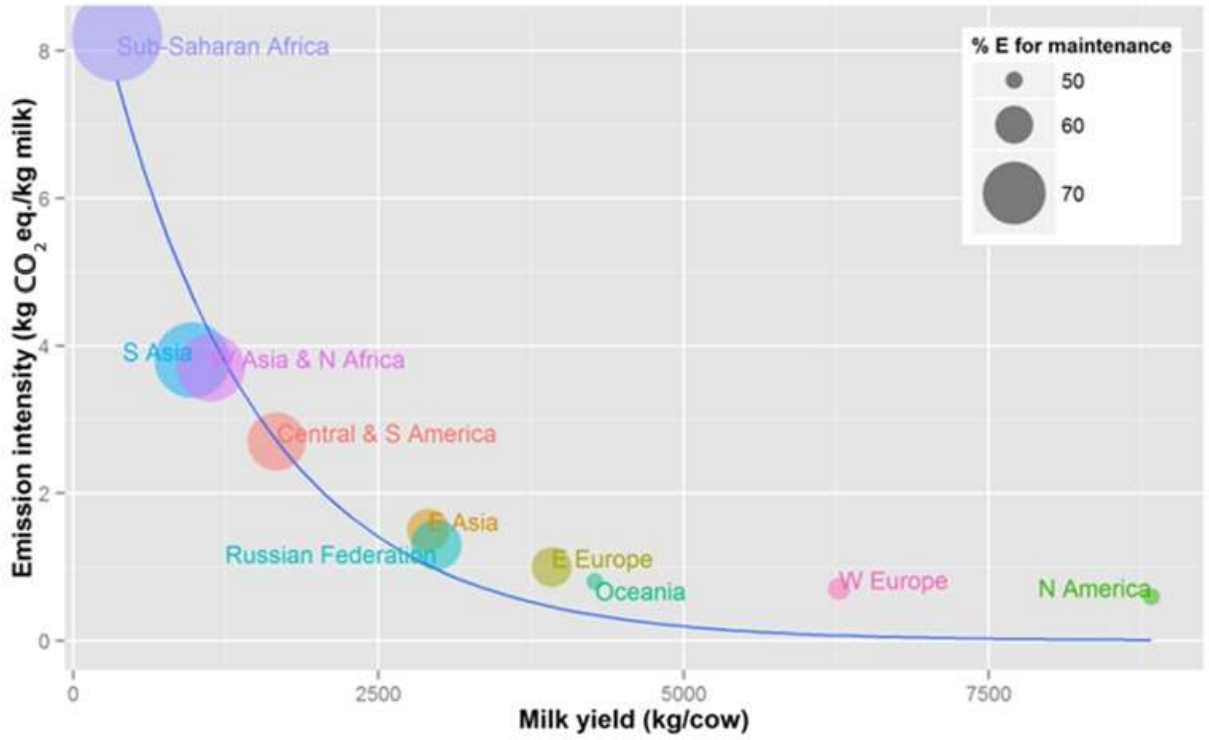
Global Methane Pledge

"…seeking abatement of agricultural emissions through technology innovation as well as incentives and partnerships with farmers."

"…moving towards using the highest tier IPCC good practice inventory methodologies, consistent with IPCC guidance, with particular focus on high emission sources, in order to quantify methane emissions."

"…maintaining up-to-date, transparent, and publicly available information on our policies and commitments."

Wide range of production efficiencies/yields



Agricultural CH_4 important in almost all regions

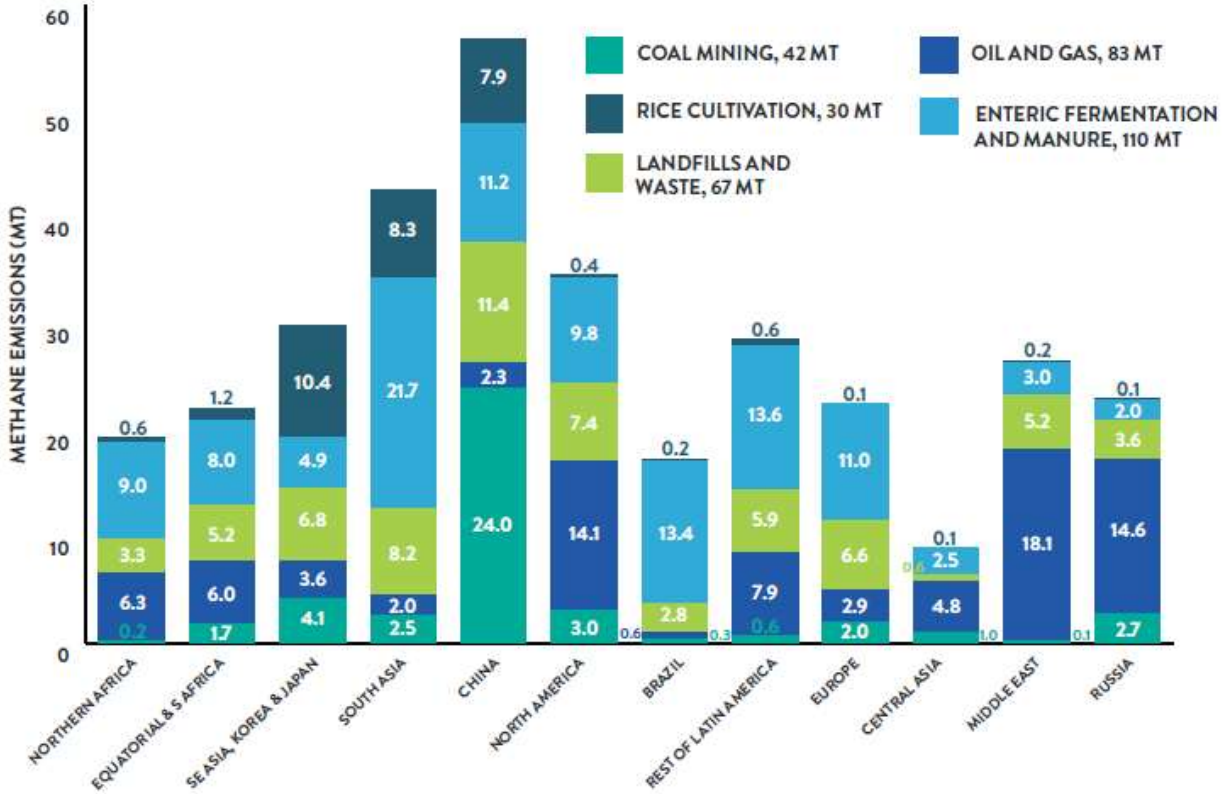


Figure 2.6 Estimated annual sectoral methane emissions by region and global sector totals, excluding Oceania, 2017, million tonnes

Source: Saunois et al. (2020).

Agricultural CH_4 mitigation

AGRICULTURAL SECTOR	**Improve animal health and husbandry:** reduce enteric fermentation in cattle, sheep and other ruminants through: feed changes and supplements; selective breeding to improve productivity and animal health/fertility
	Livestock manure management: treatment in biogas digesters; decreased manure storage time; improve manure storage covering; improve housing systems and bedding; manure acidification.
	Rice paddies: improved water management or alternate flooding/drainage wetland rice; direct wet seeding; phosphogypsum and sulphate addition to inhibit methanogenesis; composting rice straw; use of alternative hybrids species.
	Agricultural crop residues: prevent burning of agricultural crop residues.

- In each case, efficacy and cost-effectiveness is context dependent
- MRV not always straight forward
- Multiple gases with interactions between them – often trade-offs
- Have to consider system resilience and vulnerability

Accelerating action

Policy

- Harmonizing regulations, to the extent possible, to favour economic efficiency and innovation
- Improving national GHG inventories – agricultural CH_4

Implementation

- Scaling up/out of available options
- Explore how to support sectoral initiatives

Innovation

- Catalyzing investment in early-stage research
- Validating new approaches

Education

- Public education and awareness
- Building capability in LMICs

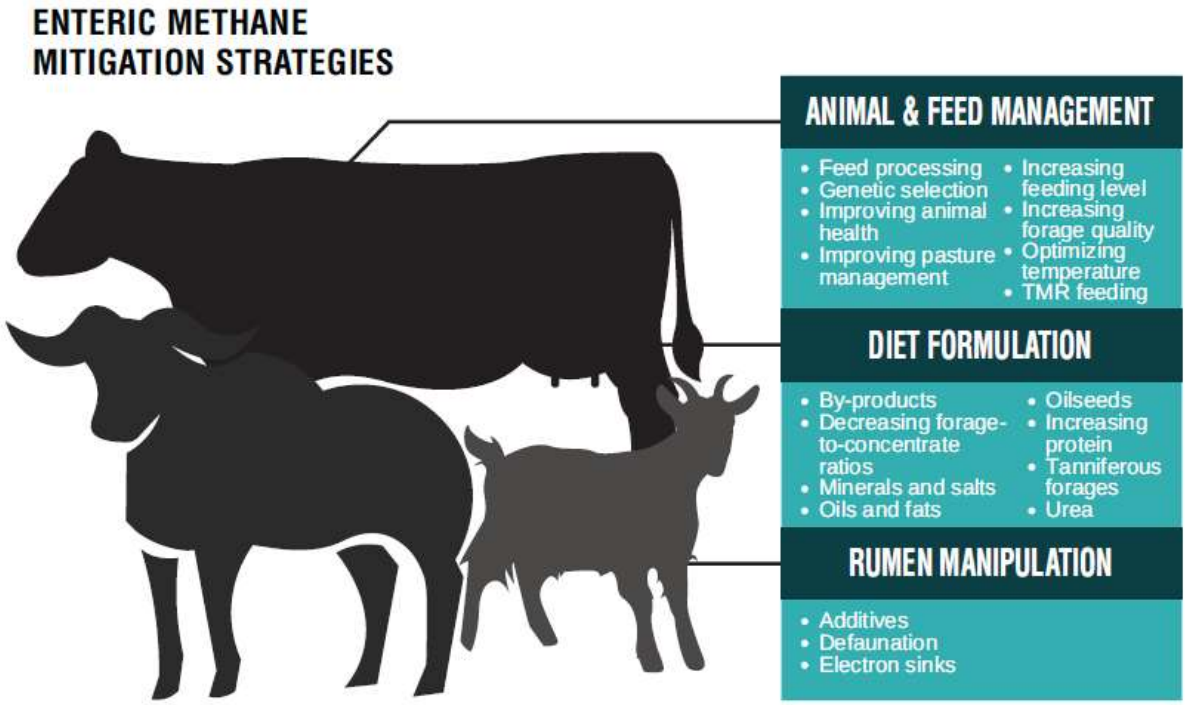
Need for improved mechanistic understanding of rumen fermentation to underpin all mitigation interventions

Trends in Microbiology

Forum

Electron flow: key to mitigating ruminant methanogenesis

Sinead C. Leahy [1,*,@], Peter H. Janssen, [2] Graeme T. Attwood, [2] Roderick I. Mackie, [3] Tim A. McAllister, [4] and William J. Kelly [1]



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 Kebreab[i], 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], Jolien B. Veneman[n], David R. Yáñez-Ruiz[o], and Zhongtang Yu[p]

Edited by Akkihebbal Ravishankara, Colorado State University, Fort Collins, CO; received June 25, 2021; accepted February 8, 2022

Can satellite observations work for agricultural CH_4 and lower cost of MRV?

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