Food and Agriculture Organization of the United Nations

REDUCING ENTERIC METHANE *for* improving food security and livelihoods

WIN-WIN opportunities *for* farmers

Ruminants are essential to the livelihoods of millions of farmers and critical to human health, global food and nutritional security. Out of 729 million poor people living in rural and marginal areas, about 430 million are estimated to be poor livestock farmers who predominantly rear ruminant animals. Ruminants convert their feed, which in many situations is of low quality and not capable of being utilised by humans, into high value food products for humans (meat and milk). They also provide important non-food benefits such as capital assets, traction, manure for fuel and fertilizers, and fiber (wool).

- Ruminants supply 51% of all protein from the livestock sector; of which 67% is from milk and 33% is from meat (global estimate).

- 80% of protein from ruminant species is derived from cattle, while buffalo, sheep and goats contribute 11%, 5% and 4%, respectively.

Ruminants are raised in a diverse range of production systems, from extensive pastoralist systems to intensive dairy or beef fattening units. The type of feed given to the animals and the share of grazing in the feeding system is a key defining factor of this diversity. Other important factors include the type and breed of the animals, herd management practices, level of integration with cropping systems, household dependence on ruminants and the level of market integration.

Ruminant production systems with low productivity, use more energy to produce each unit of animal product than those with high productivity. This also means that there is an inverse relationship between enteric methane emissions and the level of productivity, with high productivity systems also producing less methane per unit of animal product (also referred to as 'emissions intensity'). Increasing productivity across production systems increases food security and improves farmer livelihoods and has a positive benefit for climate change. The strong correlation between increases in animal productivity and reductions in enteric methane emissions offers large opportunities for low-cost mitigation and widespread social and economic benefits.

Relative to other global greenhouse gas abatement opportunities, reducing enteric methane through productivity gains is the lowest cost options and has a direct economic benefit to farmers[1].

1 Gerber, P. J., Steinfeld, H., Henderson, B., Mottet, A., Opio, C., Dijkman, J., Falcucci, A. & Tempio, G. (2013). Tackling climate change through livestock: a global assessment of emissions and mitigation opportunities. Food and Agriculture Organization of the United Nations (FAO).

WHAT *can* FARMERS DO?

Getting farmers to improve the productivity of ruminants is a key way to improve rural livelihoods and improve food security. Farming systems that are much more productive generally also reduce enteric methane emissions per unit of animal product.

Efforts in the following three areas can contribute substantially to enteric methane mitigation, food security and improved livelihoods:

While improving productivity offers the best generic low cost enteric methane mitigation options, care is needed to identify the most effective intervention packages that suit local farm systems, resources and capabilities, and avoid undesirable trade-offs. Understanding the barriers and constraints faced by farmers to up-take of these interventions is critical to ensuring widespread adoption of effective intervention packages on farms.

FEED AND NUTRITION: Improving feed quality can be achieved through improved grassland management, improved pasture species, forage mix and greater use of supplements, preferably locally available. Matching ruminant production to underlying grazing resources, ration balancing, undertaking adequate feed preparation and preservation will improve nutrient supply, ruminant productivity and fertility.

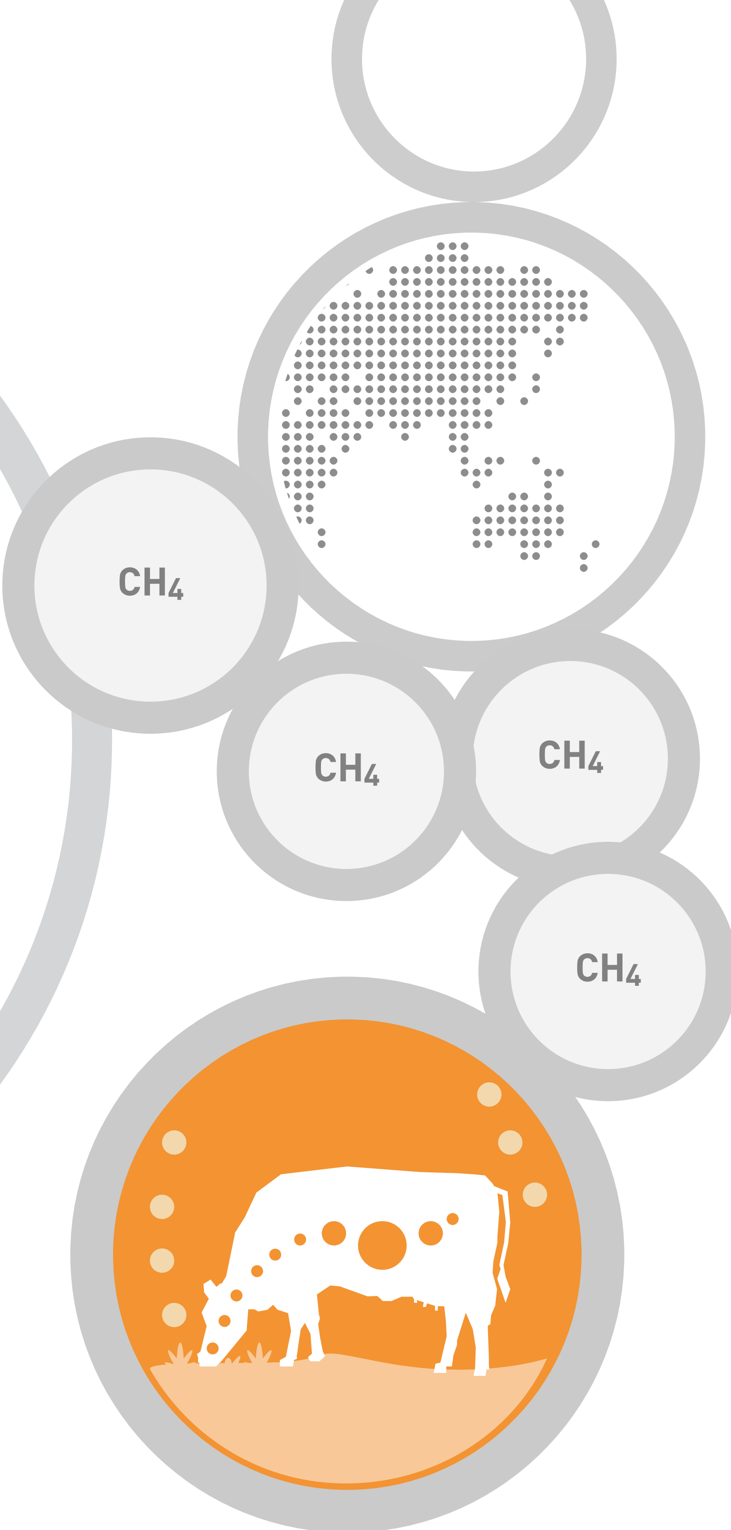
ANIMAL HEALTH AND HUSBANDRY: Improving reproductive efficiency and extending the reproductive life of the animal will improve lifetime performance per animal and reduce methane emissions per unit of animal product. Other important interventions include reducing the incidence of endemic, production-limiting diseases that have a number of negative outcomes, including death or cull of previously healthy animals, reduced live-weight gain, reduced milk yield and quality and reduced fertility.

ANIMAL GENETICS AND BREEDING: Genetic improvement is a key way of increasing productivity in livestock systems by improving such things as live-weight gain and milk yield. Breeding can help adapt animals to local conditions and can also address issues associated with reproduction, vulnerability to stress, adaptability to climate change, and disease incidence. Improved breeding management practices (using artificial insemination for example and ensuring access by farmers to wide genetic pools for selection) can accelerate those gains.

WHAT *is* enteric methane?

Enteric fermentation is a natural part of the digestive process of ruminants where microbes decompose and ferment feed present in the digestive tract to produce energy and protein along with methane. Enteric methane is simply a by-product of this process and is expelled by the animal through burping. The other products of the decomposition and fermentation process are used by the animal to make products such as milk, meat and wool.

The amount of enteric methane expelled by the animal is directly related to the amount of food eaten, which itself is influenced by animal weight, level of productivity, reproductive status and environmental factors such as temperature. It is also influenced by the type and quality of feed consumed. Between 2-12% of a ruminant's energy intake is typically lost as methane.



WHY *is* enteric methane important?

- Enteric methane is a Short-Lived Climate Pollutant (SLCP) and has a half-life of 12 years – in comparison to carbon dioxide, parts of which stay in the atmosphere for many hundreds to thousands of years. Methane traps 84 times more heat than carbon dioxide over the first two decades after it is released into the air.

- Even over a 100-year period, the comparative warming effect of 1 kg methane is 28 times greater than 1 kg carbon dioxide. Therefore, reducing the rate of enteric methane emissions would help reduce the rate of warming in the near term and, if emissions reductions are sustained, can also help limit peak warming.

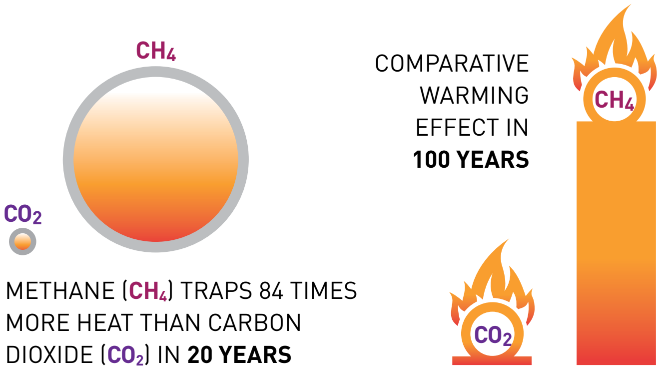
- Ruminants are responsible for 30% of global methane emissions.

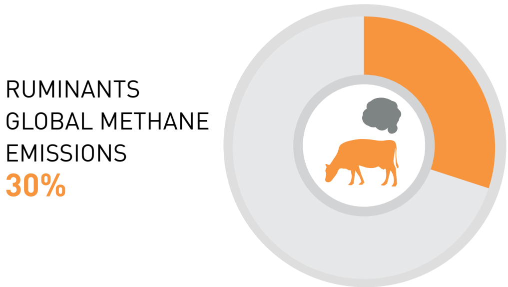
- Globally, ruminant livestock produce about 2.7 Gt of carbon dioxide equivalent enteric methane annually, or about 5.5% of total global greenhouse gas emissions from human activities.

- Cattle account for 77% of these emissions (2.1 Gt), buffalo for 14% (0.37 Gt) and small ruminants (sheep and goats) for the remainder (0.26 Gt).

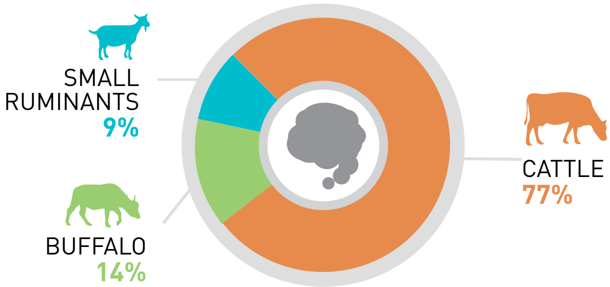
IPCC. (2013). IPCC, Assessment Report 5. Intergovernmental Panel on Climate Change (IPCC).

ENTERIC METHANE EMISSIONS





GLOBAL DISTRIBUTION OF ENTERIC METHANE EMISSIONS FROM RUMINANT (%)



the PROJECT

Emissions intensities of enteric methane vary greatly across the countries/regions involved in the project and also between and within production systems. Efforts to address enteric methane emissions in developing countries is relatively new and fragmented and the link between increasing productivity and enteric methane mitigation has only recently been highlighted.

The project will identify interventions and practices that can best address the triple challenges of food security, improved livelihoods and reducing greenhouse gas emissions. It will look to complement existing efforts, demonstrate that triple win solutions are possible and accelerate the up-take of innovative solutions. Working with researchers, policy practitioners and farmer extension groups, the project will identify and test locally appropriate cost-effective intervention packages that when implemented result in multiple benefits for farmers; including gains in farm productivity, improved food security and reduction in enteric fermentation.

The project is in two Phases:

PHASE 1 will

- **IDENTIFY AND PRIORITIZE OF HIGH POTENTIAL AREAS FOR INTERVENTION,** focusing on ruminant systems that are highly exposed and under pressure from a number of challenges like climate change, increasing competition for resources (e.g. land) and, are important in terms of food security and livelihoods.
- **IDENTIFY COST-EFFECTIVE TECHNOLOGIES AND APPROACHES** that will enable farmers to increase productivity while at the same time reduce emissions.
- **PROVIDE INFORMATION AND GUIDANCE TO DECISION-MAKERS** to assist in the widespread up-take of the new technologies and practices..

PHASE 2 will see the intervention packages tested on farm and scaled-up for widespread implementation.

The project will complement, facilitate up-scaling and acceleration of EXISTING EFFORTS to mitigate **ENTERIC METHANE EMISSIONS.**

WHO *we* ARE

This project is a collaboration between the **Food and Agriculture Organization of the United Nations** (www.fao.org) and the **New Zealand Agricultural Greenhouse Gas Research Centre** (www.nzagrc.org.nz), funded by the **Climate and Clean Air Coalition** (www.ccacoalition.org) and the **New Zealand Government in support of the Global Research Alliance on Agricultural Greenhouse Gases** (www.globalresearchalliance.org).

ACTIVITIES *to be* UNDERTAKEN

DURING PHASE 1

ACTIVITY 1

Analyze and prioritize opportunities for improved food security and resource use efficiency and identify production systems/ countries for detailed assessment

ACTIVITY 2

Develop packages of appropriate cost-effective technologies; recommend policy options that improve resource use efficiency

ACTIVITY 3

Identify demonstration sites and partners for Phase 2 on farm testing of the technical packages

ACTIVITY 4

Communication, dissemination and outreach

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