WITH THE SUPPORT OF

CLIMATE & CLEAN AIR COALITION TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS

GLOBAL RESEARCH ALLIANCE ON AGRICULTURAL GREENHOUSE GASES

NEW ZEALAND AGRICULTURAL GREENHOUSE GAS Research Centre

New Zealand Government

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REDUCING ENTERIC METHANE *for* improving food security and livelihoods

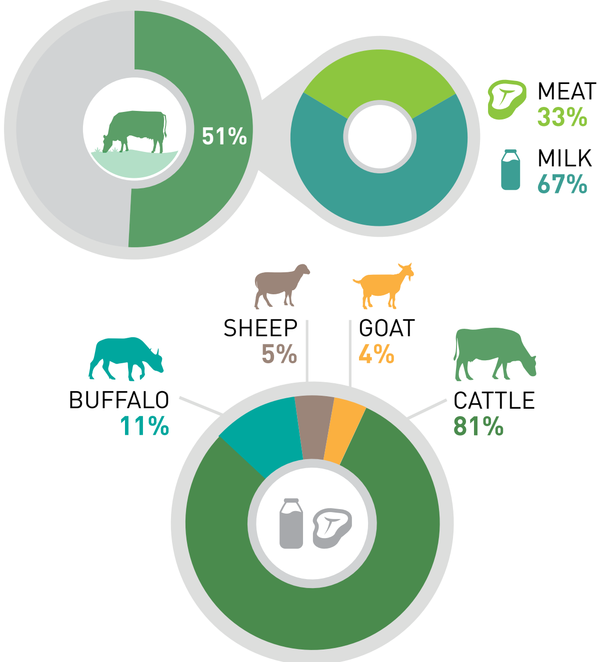
WIN-WIN opportunities *for* farmers

Ruminant production systems with low productivity, lose more energy per unit of animal product than those with high productivity. Increasing productivity across production systems increases food security and strengthens farmer livelihoods. This strong correlation between animal productivity increases and enteric methane emission reduction implies there are large opportunities for low-cost mitigation and widespread social and economic benefits.

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 contributing to the diversity of ruminant production systems 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.

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 that live in rural and marginal areas, about 430 million are estimated to be poor livestock farmers who for the most part rear ruminant animals. Ruminants convert their feed into high value food products for humans (meat and milk) through enteric fermentation. They also provide important components such as asset savings, traction, manure for fuel and fertilizers, and fiber.

RUMINANTS PROTEIN SUPPLY



- Ruminants supply 51% of all protein from the livestock sector; of which 67% and 33% is from milk and meat, respectively.

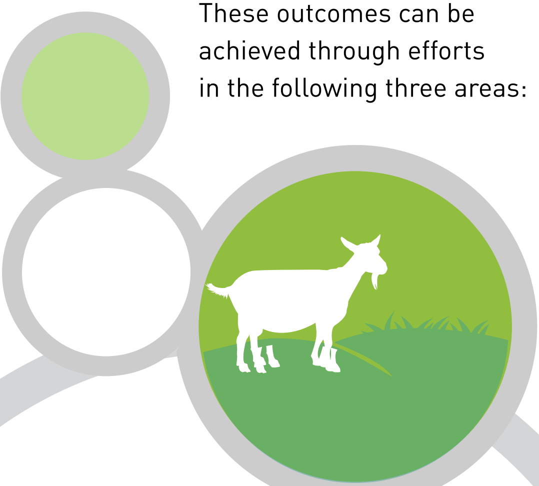
- 81% of protein from ruminant species is derived from cattle, while buffalo, sheep and goats contribute 11%, 5% and 4%, respectively

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.

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.

These outcomes can be achieved through efforts in the following three areas:



While these good practices apply generically, care is needed to identify the most effective package of interventions that fit local farm systems, resources and capabilities, and to avoid inadvertent trade-offs.

Understanding the barriers and constraints faced by farmers to up-take of the interventions is critical to ensuring widespread adoption of the effective 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 locally available supplements. Matching ruminant production to underlying grazing resources, ration balancing, undertaking adequate feed preparation and preservation will improve nutrient uptake, ruminant productivity and fertility.

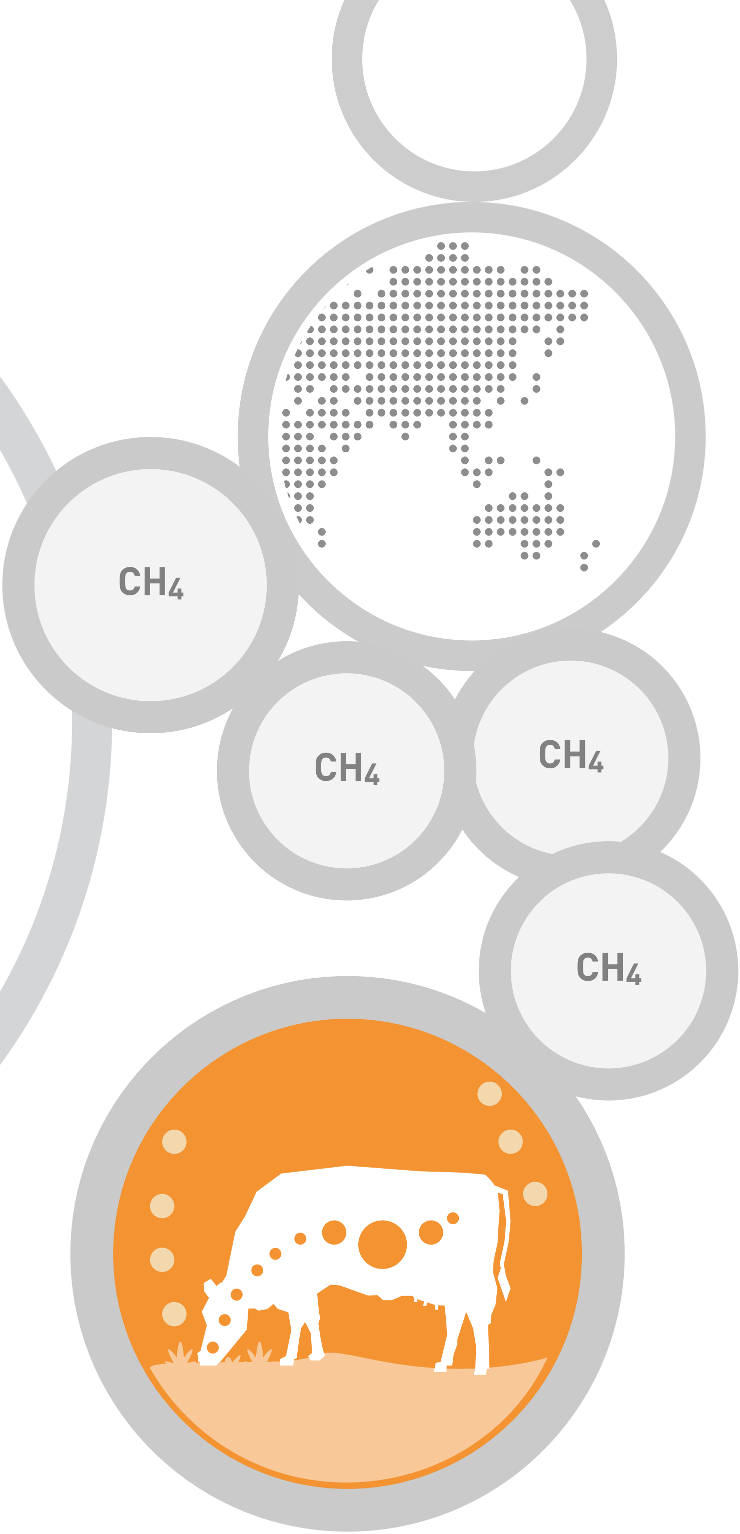
ANIMAL HEALTH AND HUSBANDRY: Improving the reproduction rates and extending the reproductive life of the animal will increase their productivity and generally reduces methane emissions intensity. Relevant interventions include reducing the incidence of endemic, production-limiting diseases that have a number of negative outcomes, including death or cull of previously healthy animals, reduced live-weight gain, reduced milk yield and quality, reduced fertility, abortion and/or increased waste in the system. Healthier animals are generally more productive and have lower emissions per unit of product.

ANIMAL GENETICS AND BREEDING: Genetic selection is a key measure increase productivity of animals. 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 food present in the digestive tract or rumen. Enteric methane is one by-product of this process and is expelled by the animal through burping. Other by-products of the fermentation process are compounds which are absorbed by the animal to make milk and meat.

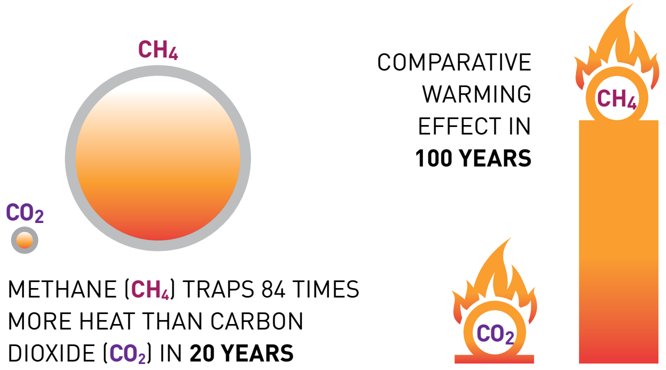
The amount of enteric methane expelled by the animal is directly related to the level of intake, the type and quality of feed, the amount of energy it consumes, size, growth rate, level of production, and environmental temperature. Between 2-12% of a ruminant's energy intake is typically lost through the enteric fermentation process.



WHY *is* enteric methane important?

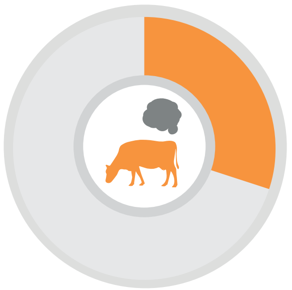
- Enteric methane is a Short-Lived Climate Pollutant (SLCP) and has a half-life of 12 years – in comparison to carbon dioxide, parts of which stay in the atmosphere for many hundreds to thousands of years. Methane traps 84 times more heat than Carbon Dioxide over the first two decades after it is released into the air.
- Even over a 100-year period, the comparative warming effect of enteric methane is 28 times greater than carbon dioxide (per kg). 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 CO2 eq. of 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).

ENTERIC METHANE EMISSIONS

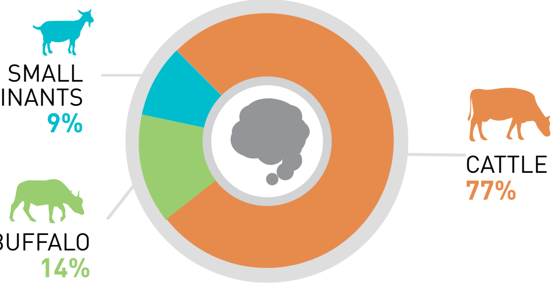


METHANE (CH_4) TRAPS 84 TIMES MORE HEAT THAN CARBON DIOXIDE (CO_2) IN **20 YEARS**

RUMINANTS GLOBAL METHANE EMISSIONS **30%**



GLOBAL DISTRIBUTION OF ENTERIC METHANE EMISSIONS FROM RUMINANT (%)



the PROJECT

Emissions intensities of enteric methane vary greatly across the regions and also between and within production systems. Efforts to address enteric methane emissions in developing regions is relatively new and fragmented, with a number of on-going initiatives each targeting a single component of the challenge.

The project will complement these existing efforts to address enteric methane emissions and accelerate the uptake of innovative solutions. Working with researchers, policy practitioners and farmer extension groups we will design cost-effective packages of technical interventions that can be implemented to 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 AND DISSEMINATE INFORMATION about the cost-effective technologies and approaches that will enable farmers to increase productivity while at the same time reduce emissions.
- PROVIDE GUIDANCE TO DECISION-MAKERS to ensure 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 address **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 the identification of 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