REDUCING ENTERIC METHANE

for improving food security and livelihoods

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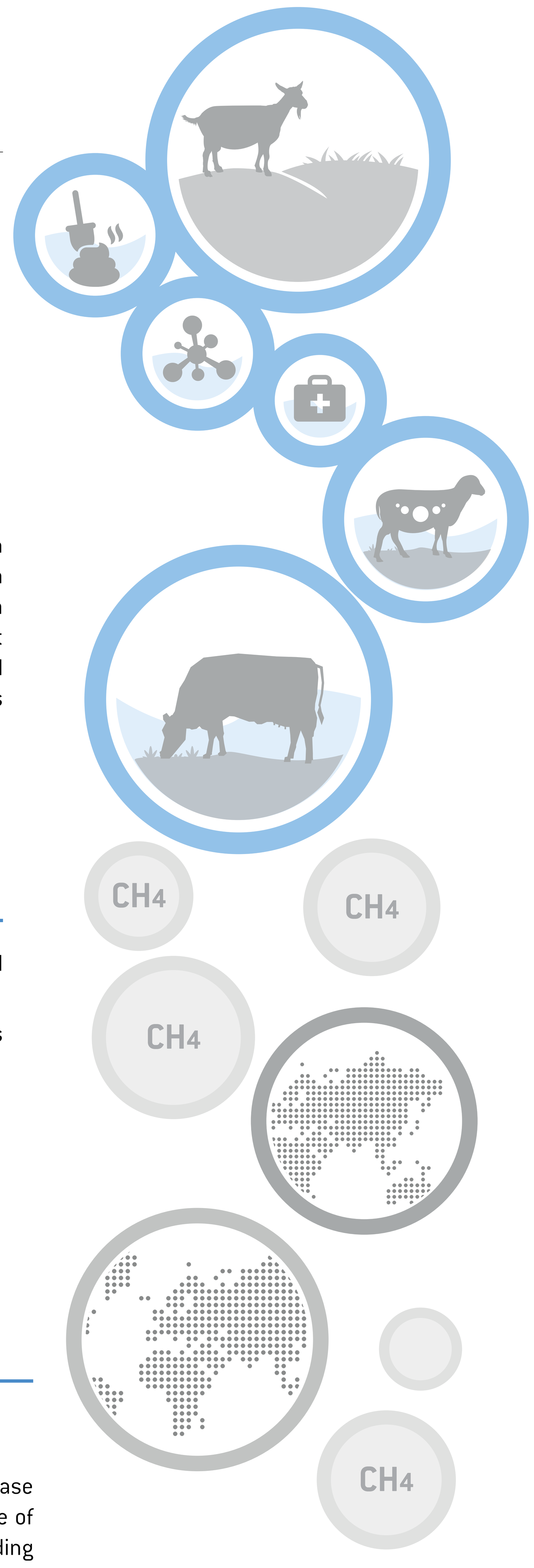
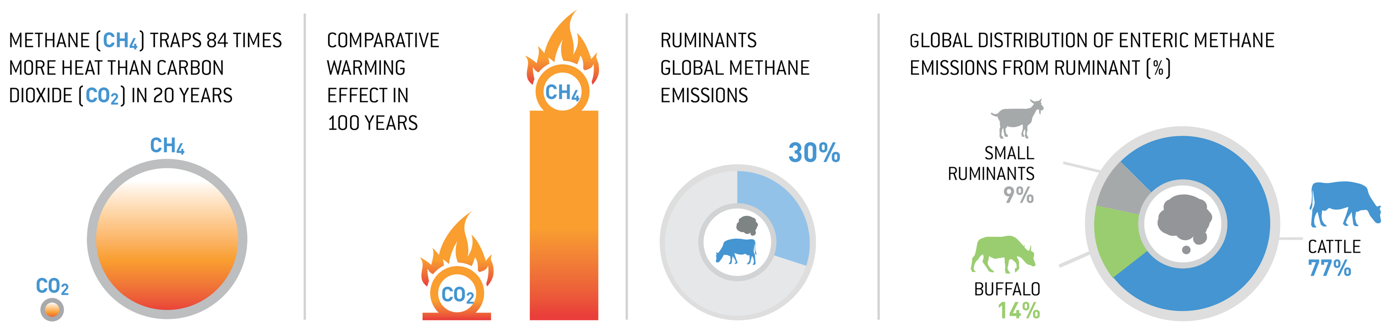


Emissions intensities (Ei) of enteric methane (CH_4) vary greatly across the globe and are often higher in developing country regions where productivity is low and milk and meat output is growing fast to meet demand, information on activity data and emission factors are weak but where there is a large potential for Ei reduction. Efforts to identify mitigation options and potentials that simultaneously improve food security and livelihoods are relatively new and fragmented, with limited knowledge about the effectiveness and the applicability of mitigation measures over a range of regionally specific livestock production systems. In addition, there is a growing realisation that mitigation actions cannot be considered in isolation; true mitigation potential needs to consider 'packages' of actions assessed in terms of impacts on multiple gases and synergies or trade-offs between individual actions.

This project complements existing initiatives by developing baseline emissions profiles in beef production systems in South America (Argentina, Uruguay), and dairy production systems in Sub Saharan Africa (Ethiopia, Kenya, Uganda, Tanzania, Benin, Burkina Faso, Senegal, Mali, and Niger) and South Asia (Bangladesh, Sri Lanka). It will identify packages of existing low-cost or no-cost mitigation measures that also increase productivity and thus deliver against food security and development goals, and understand barriers to uptake and the economic costs and benefits of the measures. The goal is to identify packages of measures that fit local farm systems, resources and capabilities and avoid inadvertent trade-offs.

WHY IS CH_4 IMPORTANT?

- CH_4 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. CH_4 traps 84 times more heat than CO_2 over the first two decades after it is released into the air.
- Even over a 100-yr period, the comparative warming effect of CH_4 is 28 times greater than carbon dioxide (per kg). Using the 20-year GWP for CH_4 – a measure of the short-term climate impact of different GHGs –the share of CH_4 increases to over 18% of global GHG (with emissions of 49 Gt CO_2e), from slightly less than 6% at the 100-year timeframe. Therefore, reducing the rate of CH_4 emissions would help reduce the rate of warming in the near term and, if emissions reductions are sustained, can also help limit peak warming.
- About 70% of the CH_4 emissions from agriculture are attributed to enteric fermentation.
- Globally, ruminant livestock produce about 2.7 Gt CO_2 eq. of CH_4 annually, or about 5.5% of total global GHG 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).



WHAT CAN FARMERS DO?

Agriculture is the source of livelihood for one-third of all mankind; about 60% of farmers own livestock. Livestock are essential to the livelihoods of millions of producers and critical to human health and global food and nutritional security. A large proportion of these livestock keepers are highly exposed and vulnerable to climate change. Out of 729 million poor people that live in rural and marginal areas, about 430 million are estimated to be poor livestock keepers.

Helping farmers 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 CH_4 Ei. Outcomes will be achieved by making improvements in the following three areas:

Feed and Nutrition

Improving feed quality 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

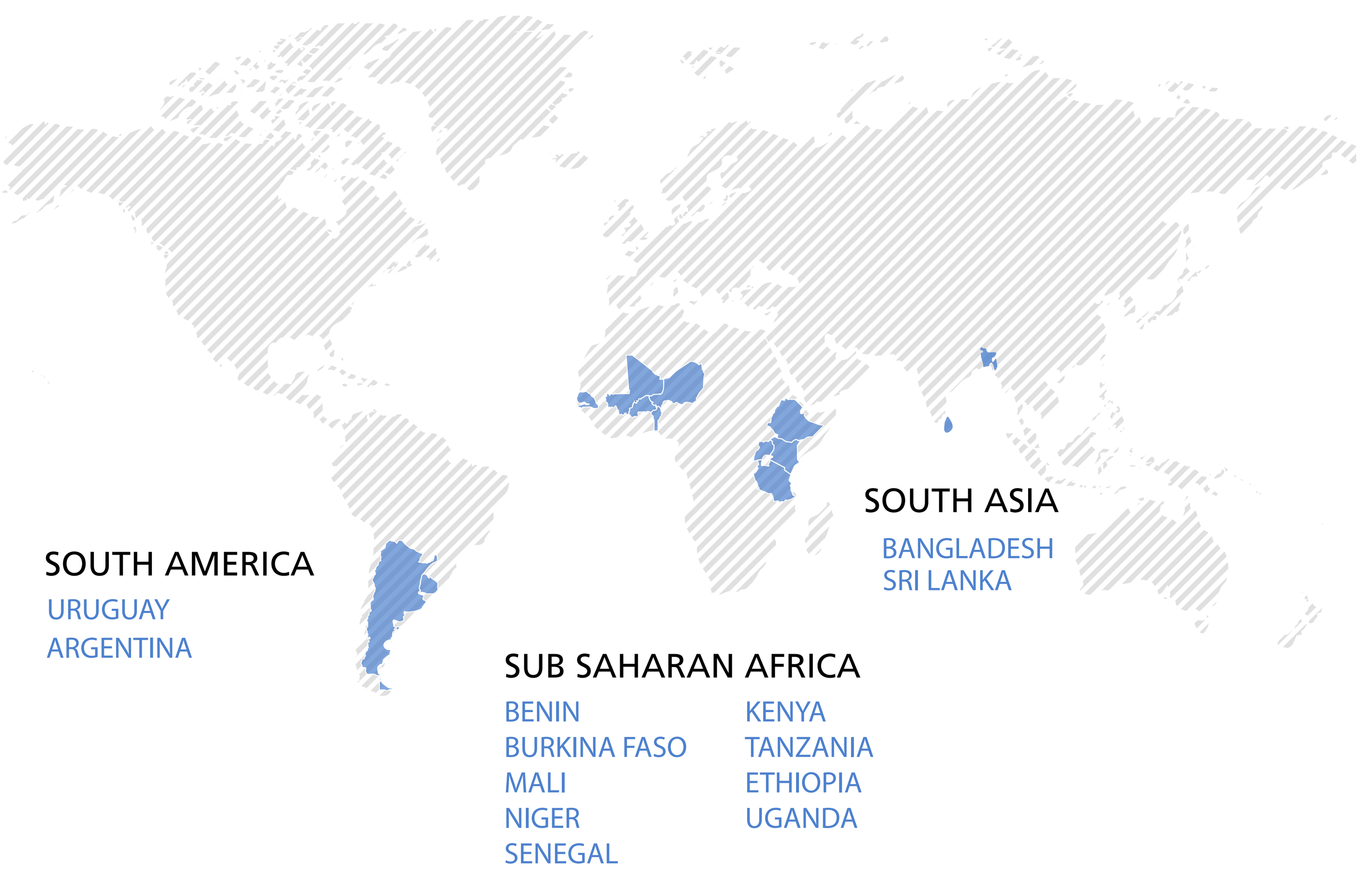
Improving the reproduction rates and extending the reproductive life of the animal will increase productivity and reduce CH_4 Ei. Relevant interventions include reducing the incidence of endemic, production-limiting diseases that have a number of negative outcomes, including death or cull of previously 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 Ei.

Animal Genetics and Breeding

Genetic selection is a key measure to increase productivity of animals. Breeding can help adapt animals to local conditions and address issues associated with reproduction, vulnerability to stress, adaptability to climate change, and disease incidence. Improved breeding management practices (using AI for example and ensuring access to wide genetic pools for selection) can accelerate those gains.

THE PROJECT

We are working with stakeholders in 14 countries (see map), to design production system specific cost-effective packages of interventions that can be implemented on farm to result in multiple benefits for farmers; including gains in farm productivity, improved food security and reduction in enteric fermentation.



THE PROCESS

2015 – MAY

Dairy production (South Asia, Sub Saharan Africa)
Beef Production (South America)

Activity 1
- Regional stakeholder workshops
- Identify areas of high potential for intervention
- Local scientists lead the data collection

DECEMBER

Activity 2
- Baseline emissions & mitigation potential modelled in GLEAM
- Mitigation packages developed at farm level in 14 countries
- Barriers to uptake understood
- Economic costs of mitigations documented

2016 – APRIL

Activity 3
Confirm:
- Regional partners, funding options
- Test sites for phase 2
- Intervention packages for implementation
- Scalability/uptake options

MAY

Activity 4
- Communication, dissemination & outreach

AUGUST

PHASE 2

A case study:
MIXED DAIRY PRODUCTION IN EAST AFRICA

East Africa has approximately 10% of the world dairy cows but produces only 1% of the global milk. Dairy production is developing fast and the predominant mixed farming systems produce 75% of total milk production. Kenya is the largest producer, with 37% of total milk produced in East Africa and a dynamic dairy sector that has increased by 60% since 1990, as a response to growing domestic demand. Ethiopia, Tanzania and Uganda, with respectively 21%, 14% and 10% of the region's milk production, have also a dynamic dairy sector.

East African mixed dairy systems account for only 5% of global GHG emissions from mixed dairy systems but Ei is nearly 4 times higher than the global average for mixed dairy systems (10.4 and 2.7 kg CO_2 e/kg FCPM).

CH_4 is the largest source of emissions for these systems, with about 60% of total emissions, as a result of low feed quality (average feed digestibility of 54% compared with the global average of 59%) and poor animal performances (growth rates and milk yields) leading to an important overhead herd (72% of the mixed dairy herd of non-milk producing animals compared with a global average of 41%).

In low productivity systems such as East Africa, diet improvements through improved digestibility have the highest mitigation potential, owing to its large impact on several sources of emissions. The mitigation potential of improving feed quality reaches 19% of baseline emissions, two thirds of the total mitigation potential. Mitigating in this way will improve productivity; an increase in milk production of 15% to 20% and a decrease in overall emissions of 8% to 11%.

MITIGATION ESTIMATES COMPUTED FOR MIXED DAIRY CATTLE SYSTEMS OF EAST AFRICA

FARMING SYSTEM		MIXED DAIRY PRODUCTION IN EAST AFRICA
Absolute potential (Mt CO_2-eq)		17 to 29
Share of baseline emissions		16 to 27%
of which:	Improved feed quality	12 to 19%
	Improved herd structure	4.2 to 7.8%

PARAMETERS MODIFIED TO EVALUATE THE MITIGATION POTENTIAL IN EAST AFRICA MIXED DAIRY SYSTEMS

MODEL PARAMETER		BASELINE	MITIGATION SCENARIO
FEED	Average Digestible Energy (digestibility) of feed fed to milking cows (%)	54.4	56.0 to 57.1
HERD	Fertility rates of adult females (%)	72	73.5 to 75
	Mortality rates, calves (%)	21	15 to 18
	Mortality rates, other (%)	7	5 to 7
Milk yield		165-600 kg	196-750 kg

ACKNOWLEDGEMENTS
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