Reduction of GHG from smallholder dairy farms in Asian countries
**Experiences with reducing GHG in dairy sector
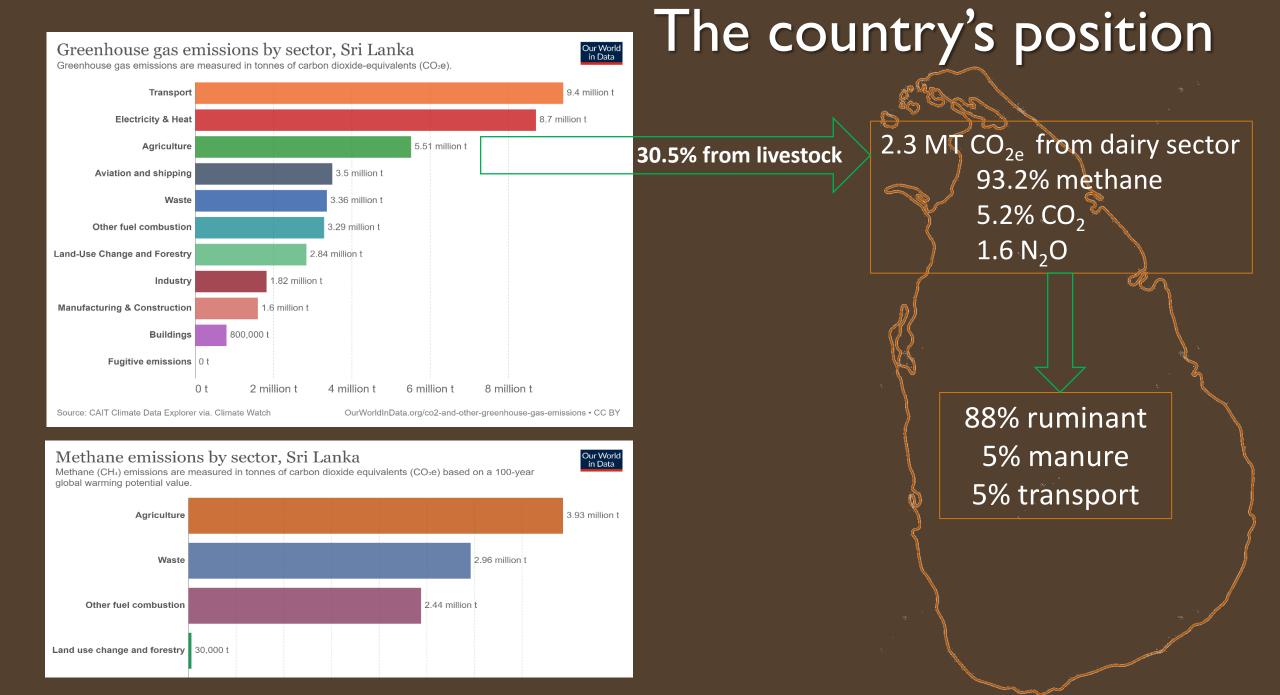Sri Lanka**
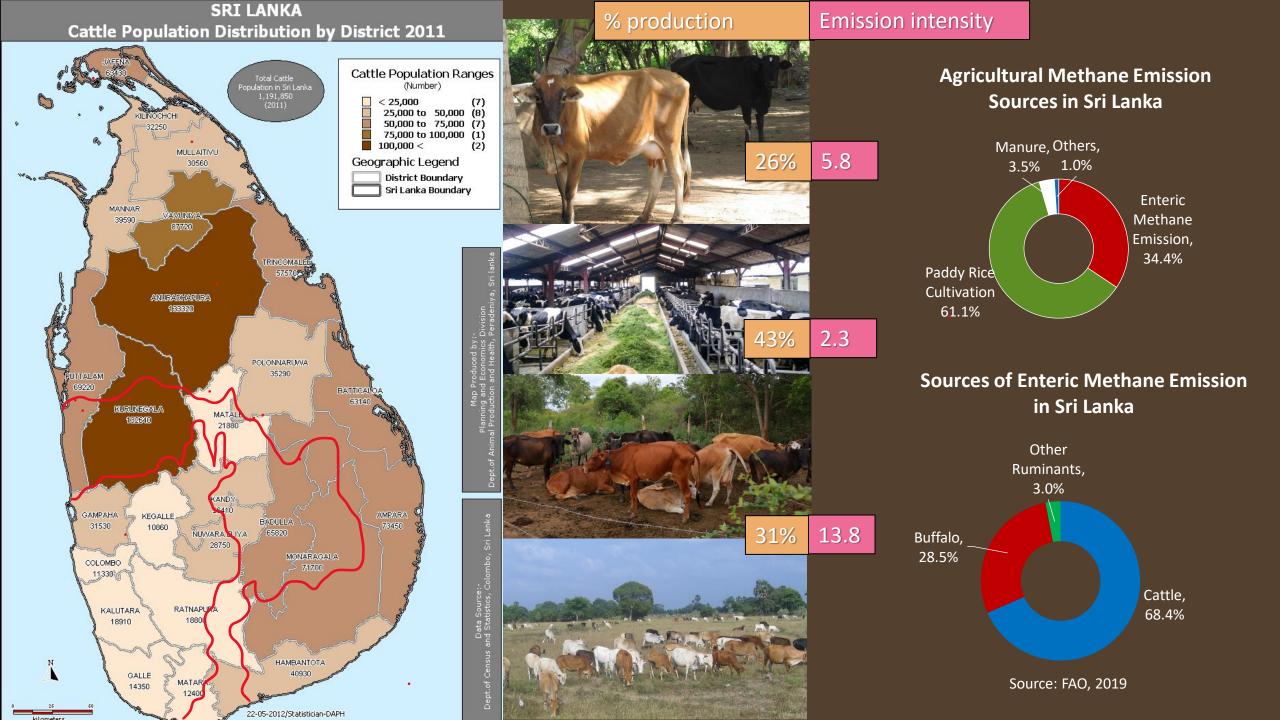
Joined IDF/WUR/CGIAR Webinar

28th October 2021

Pradeepa Silva, University of Peradeniya, Sri Lanka
Janak Vidanarachchi, University of Peradeniya, Sri Lanka
W.M.P.B Weerasinghe, Veterinary research Institute, Sri Lanka

The country context

- Diverse Argo-climatic environment.
- Agric sector – 28% of population
    - 30% in Livestock (400,000 farmers)
- Smallholder farmers, 1-3 dairy animals, 70% milk production.
- Milk as a 'cash crop'
- 7.5% to agricultural GDP and 0.8% to the total GDP.

- Main GDP contributor – Cattle + Buffalo (1.6 + 0.5 mil heads; 414 mil L milk; 38% of requirement)
- Average milk production 3.35 L/cow/day (1-6 L/cow/day), 2 L/Buffalo/day)
- 96,811 MT milk powder imported spending 300 mil US$
- Per capita Liquid milk$_{eq}$ consumption 63.3 L

- Annual share of global CO_2 emission – 0.07%.
- Per capita emission - 1.17 tones.
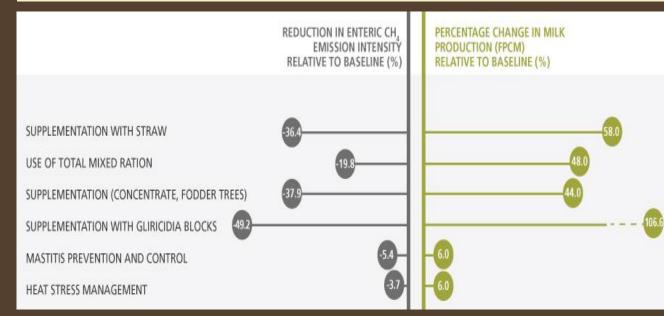- Low-carbon-intensive development pathway.

The country's position

Greenhouse gas emissions by sector, Sri Lanka
Greenhouse gas emissions are measured in tonnes of carbon dioxide-equivalents (CO_2e).

Sector	Emissions
Transport	9.4 million t
Electricity & Heat	8.7 million t
Agriculture	5.51 million t
Aviation and shipping	3.5 million t
Waste	3.36 million t
Other fuel combustion	3.29 million t
Land-Use Change and Forestry	2.84 million t
Industry	1.82 million t
Manufacturing & Construction	1.6 million t
Buildings	800,000 t
Fugitive emissions	0 t

Source: CAIT Climate Data Explorer via. Climate Watch

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY

30.5% from livestock

2.3 MT CO_{2e} from dairy sector
93.2% methane
5.2% CO_2
1.6 N_2O

88% ruminant

5% manure

5% transport

Methane emissions by sector, Sri Lanka
Methane (CH_4) emissions are measured in tonnes of carbon dioxide equivalents (CO_2e) based on a 100-year global warming potential value.

Sector	Emissions
Agriculture	3.93 million t
Waste	2.96 million t
Other fuel combustion	2.44 million t
Land use change and forestry	30,000 t

SRI LANKA
Cattle Population Distribution by District 2011

Total Cattle Population in Sri Lanka 1,191,850 (2011)

Cattle Population Ranges (Number)
- < 25,000 (7)
- 25,000 to 50,000 (8)
- 50,000 to 75,000 (7)
- 75,000 to 100,000 (1)
- 100,000 < (2)

Geographic Legend
- District Boundary
- Sri Lanka Boundary

JAFFNA 63490
KILINOCHCHI 32250
MULLAITIVU 30560
MANNAR 39590
VAVUNIYA 87720
TRINCOMALEE 57570
ANURADHAPURA 133320
POLONNARUWA 35290
BATTICALOA 63140
PUTTALAM 69220
KURUNEGALA 132640
MATALE 21880
KANDY 25410
AMPARA 73450
GAMPAHA 31530
KEGALLE 10860
NUWARA ELIYA 28750
BADULLA 65820
COLOMBO 11330
MONARAGALA 71700
KALUTARA 18910
RATNAPURA 18800
HAMBANTOTA 40930
GALLE 14350
MATARA 12400

Map Produced by:- Planning and Economics Division Dept.of Animal Production and Health, Peradeniya, Sri lanka

Data Source:- Dept.of Census and Statistics, Colombo, Sri Lanka

22-05-2012/Statistician-DAPH

kilometers

% production | Emission intensity

26% | 5.8
43% | 2.3
31% | 13.8

Agricultural Methane Emission Sources in Sri Lanka

- Manure, 3.5%
- Others, 1.0%
- Enteric Methane Emission, 34.4%
- Paddy Rice Cultivation 61.1%

Sources of Enteric Methane Emission in Sri Lanka

- Other Ruminants, 3.0%
- Buffalo, 28.5%
- Cattle, 68.4%

Source: FAO, 2019

Experiences with mitigation options

Feeding options

- Adaptation of balanced ration
- Advanced feeding methods: Total mixed ration (TMR)
- Supplementary feeds: Tree fodder
                         Low-cost concentrate
                         UMMB

- Feed conservation and preservation (silage, hey etc.)
- Use of ICT in awareness attempts

Breeding options

- Breeding policy recommendations
- THI guided breed recommendations
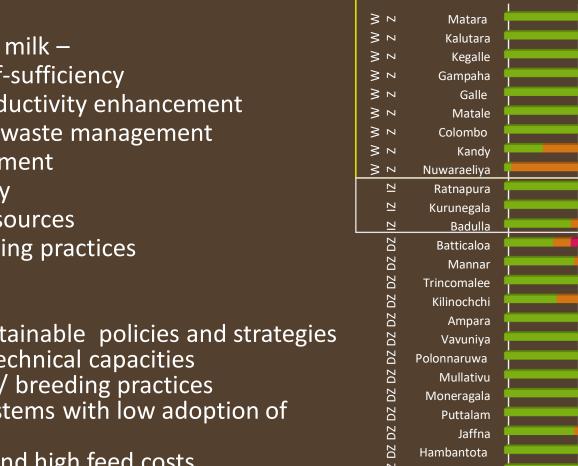- Increase productive milking cow % in the national herd

% Productive Cow Population by Provinces

Management options

↑ herd health (Disease diagnosis. Vaccination)
animal comfort (housing, flooring, Fog-ventilation)
energy utilization/ options (solar power, biogas)

	REDUCTION IN ENTERIC CH$_4$ EMISSION INTENSITY RELATIVE TO BASELINE (%)	PERCENTAGE CHANGE IN MILK PRODUCTION (FPCM) RELATIVE TO BASELINE (%)
SUPPLEMENTATION WITH STRAW	-36.4	58.0
USE OF TOTAL MIXED RATION	-19.8	48.0
SUPPLEMENTATION (CONCENTRATE, FODDER TREES)	-37.9	44.0
SUPPLEMENTATION WITH GLIRICIDIA BLOCKS	-49.2	106.6
MASTITIS PREVENTION AND CONTROL	-5.4	6.0
HEAT STRESS MANAGEMENT	-3.7	6.0

FAO & New Zealand Agricultural Greenhouse Gas Research Centre. 2017

Bottlenecks and opportunities
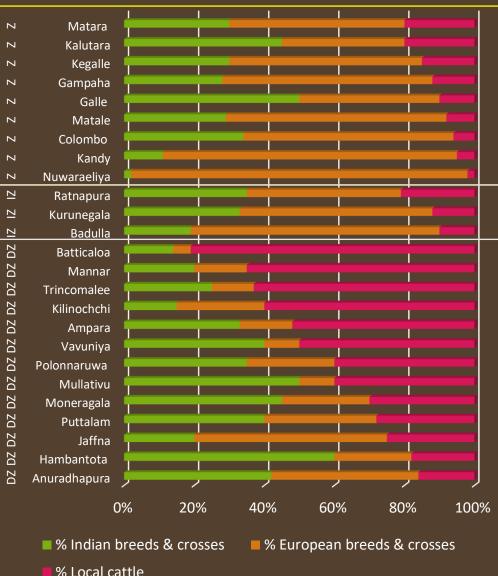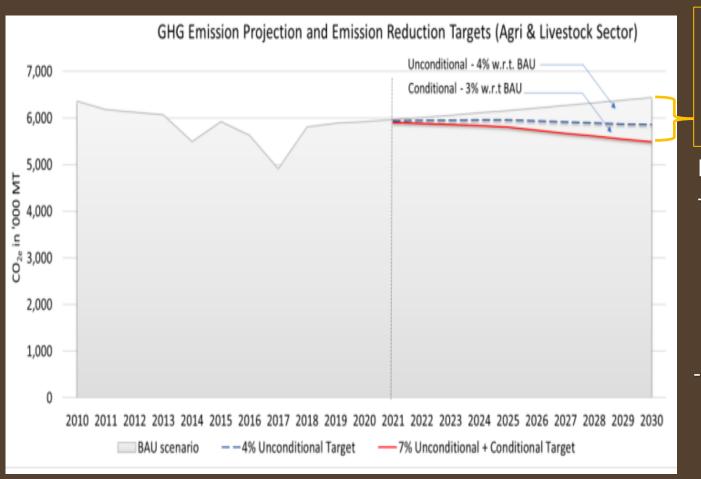
Opportunities
- Increasing demand for milk –
  40% ⟶ 100% self-sufficiency
- Per cow/ per herd productivity enhancement
- Emission reduction by waste management options/ manure treatment
- Adoption of technology
- Under-utilized feed resources
- Integrated/mixed farming practices

Bottlenecks
- Lack of dedicated/ sustainable policies and strategies
- Lack of financial and technical capacities
- Substandard selection/ breeding practices
- Diverse production systems with low adoption of technology
- Lack of grazing lands and high feed costs.
- Unproductive, feral cattle/buffalo population
- Poor feeding systems,
- Poor animal welfare.

Genotype of cattle

- % Indian breeds & crosses
- % European breeds & crosses
- % Local cattle
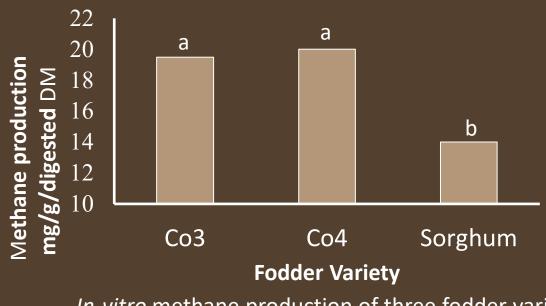
National or local strategies/ commitments to reduce GHG from dairy farming

GHG Emission Projection and Emission Reduction Targets (Agri & Livestock Sector)

Unconditional - 4% w.r.t. BAU
Conditional - 3% w.r.t BAU

CO$_{2e}$ in '000 MT

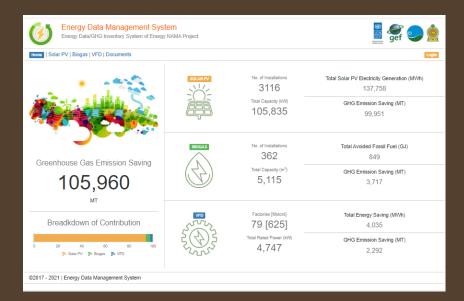BAU scenario — 4% Unconditional Target — 7% Unconditional + Conditional Target

- 2021 to 2030 commitment to reduce GHG emissions by 7% (against BAU)
  - i.e. 2,477,400 MT CO$_{2e}$ u/cond., 1,858,000 MT CO$_{2e}$ cond.

How to get there?
- Improve dairy sector productivity (40% ; 55% increase by 2030)
  - Herd management (40% productive cow)
  - Herd health management
  - Feed strategies
  - Improve animal comfort and welfare
- Use renewable energy for livestock applications
  - Small-scale solar-powered milk storage facility
  - Solar-powered can-coolers
  - Solar energy for farm operation and processing
  - Biogas digesters for dairy operations/processing
- Promote appropriate crop-livestock integrated farming systems in climate vulnerable regions

Country's actions on GHG reduction from dairy

In-vitro methane production of three fodder varieties harvested at 8th week of maturity

Energy data management system by Energy Data/GHG Inventory System of Energy - Nationally Appropriate Mitigation Actions (NAMA) Project

- Mitigation action on energy use - Technology Application Priorities developed

  - under Biogas, Biomass and Solar Trilateral Cooperation Transitioning to Sustainable Energy Uses in the Agro-Industry Project Sri Lanka - China – Ethiopia; United Nations Development Programme, Sri Lanka.

- Estimation of country-specific emission factors for methane emission from enteric fermentation

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Thank you