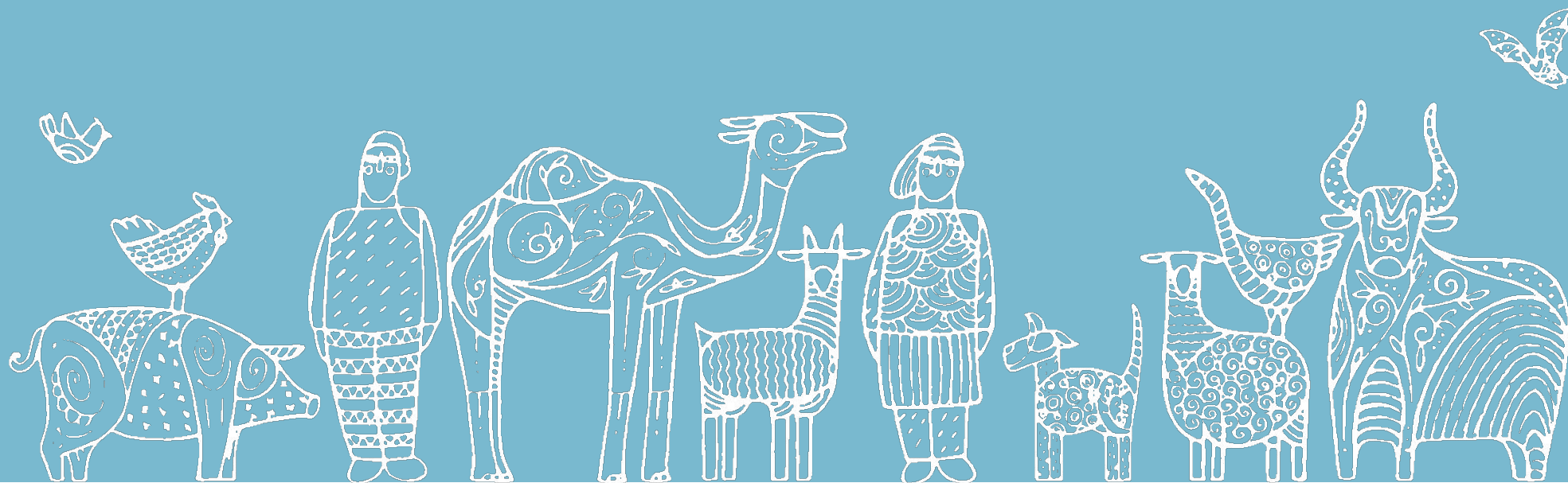




Food and Agriculture
Organization of the
United Nations

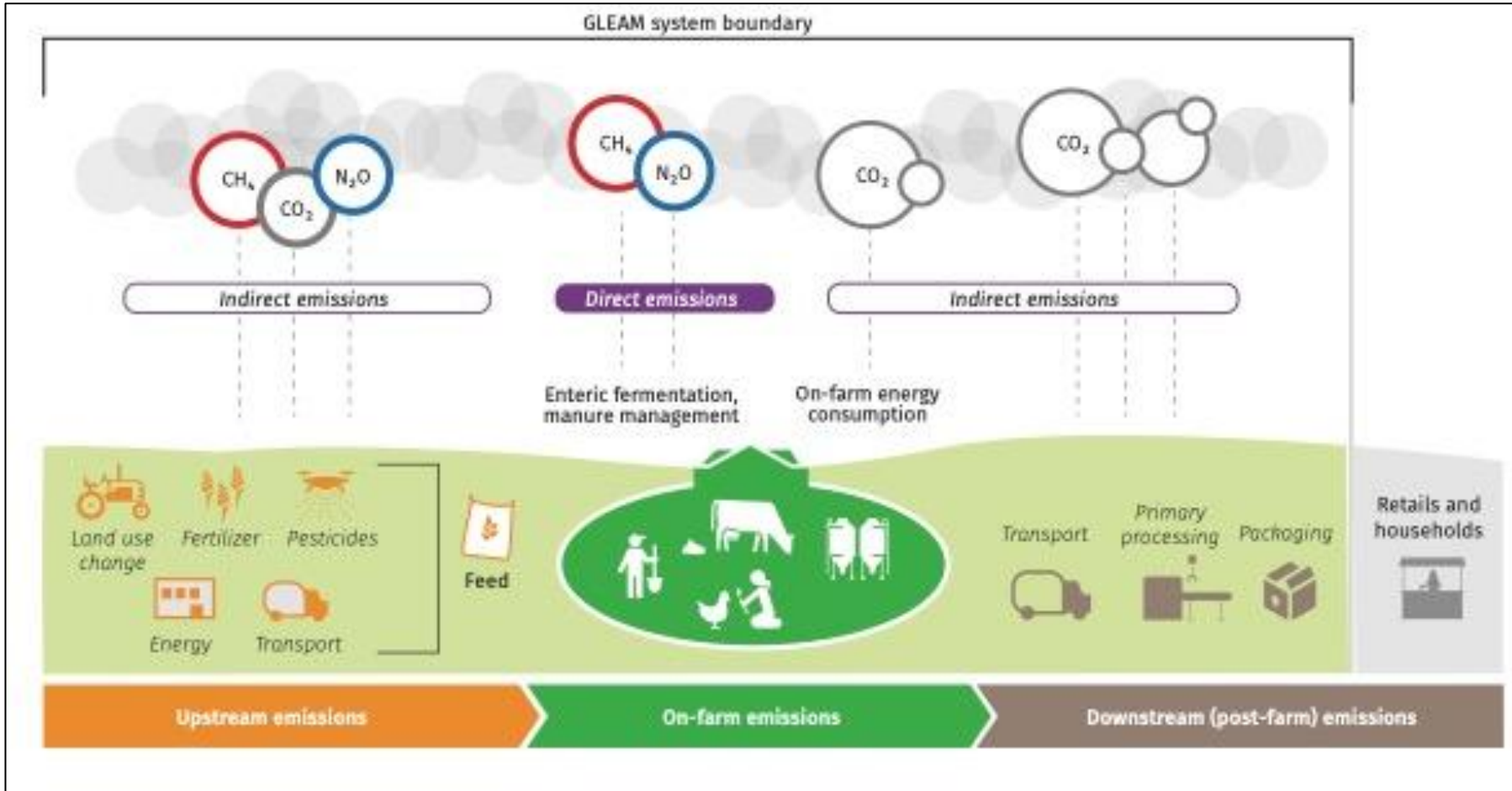


Identifying opportunities to work together in Africa

Dominik Wisser

Animal Production and Health Division, FAO, Rome

Global Livestock Environmental Assessment Model (GLEAM)



Livestock production chain analysis:

GHG emission and footprint
Water use and scarcity
Production
Economic analysis

Life cycle analysis
Spatial model
Global coverage
IPCC compliant analysis
Tier 2 approach (cohorts, DM intake..)
Tracing feed impacts through trade
Allocation to meat, milk, eggs (manure, wool)

GLEAM versions

A brief history of livestock GHG assessments at FAO



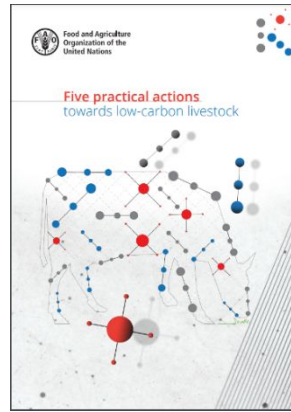
Pre-GLEAM

Non-spatial
 IPCC. 1997.
 Revised 1996 IPCC guidelines
 for national GHG inventories



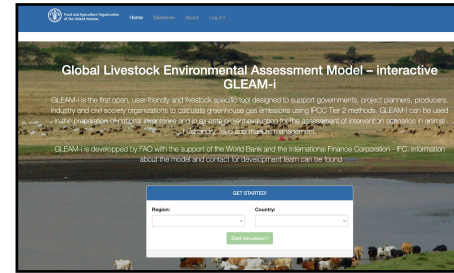
GLEAM 1

base year 2005
 2006 IPCC Guidelines
 for GHG Inventories



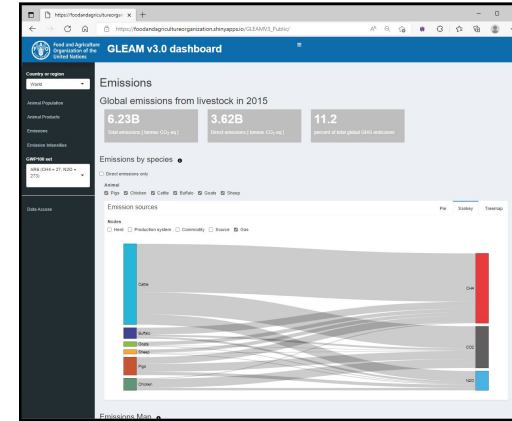
GLEAM 2

base year 2010
 IPCC 2006, 2006 IPCC Guidelines
 for National GHG Inventories



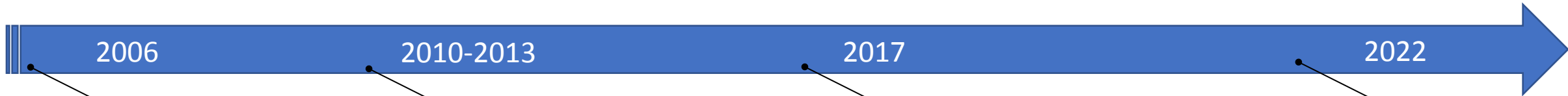
GLEAM -i

Online app for mitigation options
 Default data: GLEAM 2
 Baseline and scenario: user-defined
 Non-spatial



GLEAM 3

base year 2015
 IPCC 2019, 2019 Refinement to the 2006 IPCC
 Guidelines for National GHG Inventories



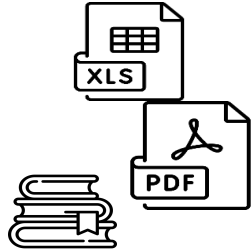
IPCC TAR (2001)
 $GWP_{100} (CH_4 = 23, N_2O = 296)$

IPCC AR4 (2007)
 $GWP_{100} (CH_4 = 25, N_2O = 298)$

IPCC AR5 (2014)
 $GWP_{100} (CH_4 = 34, N_2O = 298)$

IPCC AR6 (2021)
 $GWP_{100} (CH_4 = 27, N_2O = 273)$

FAO's Livestock Data



- More than **100 million** records
- Over **200 countries**
- **Subnational** data: regions, provinces, districts...
- Data span from **1970 to 2023**
- **Global network** of contacts
- **Official sources** (census, statistical offices, ministries, publications...)

Livestock population

Cattle, buffaloes, sheep and goats, llamas, alpacas and camels, donkeys, horses and mules, chicken, ducks, turkeys, fowls...



Production Systems

Grassland and mixed, intensive and extensive...



Productivity parameters (GLEAM)

Fertility and mortality rate, live weights, bull to cow ratio, milk yield, carcass weights...

Feed quality data

~ 200 feed items with nutritional values (crops, by-products, cakes)



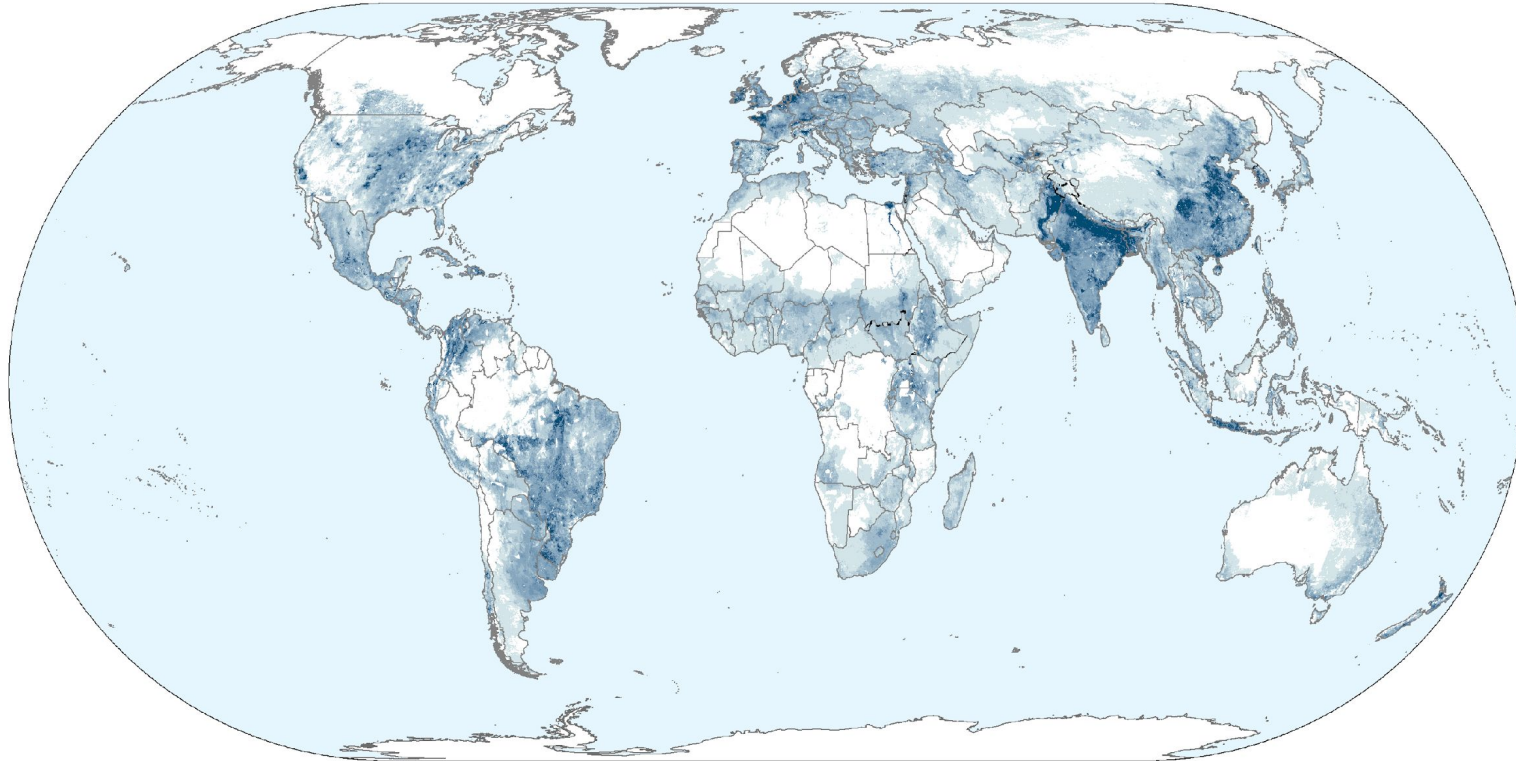
Animal production

Meat and milk, skin and wool, eggs...

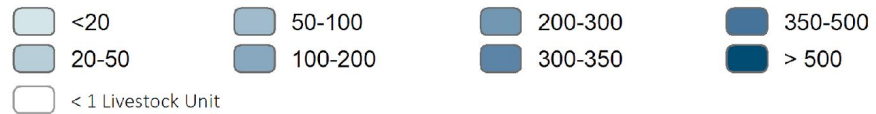
Supplementary data

- Animal health data
- Prices and costs of inputs
- Farm level data

Total GHG emissions from livestock systems



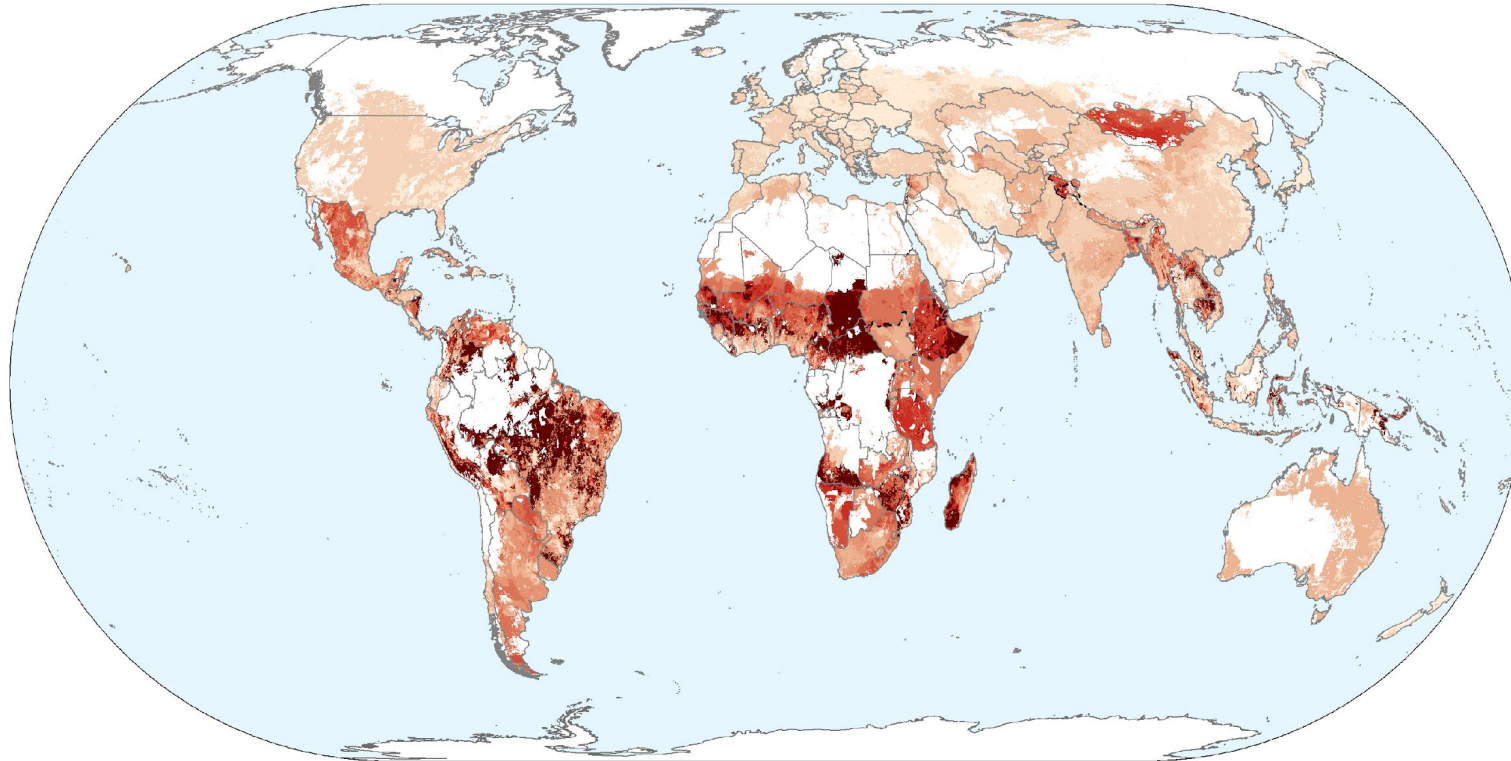
Total GHG emissions from global livestock supply chains
(Tonnes of CO₂ eq per sqkm)



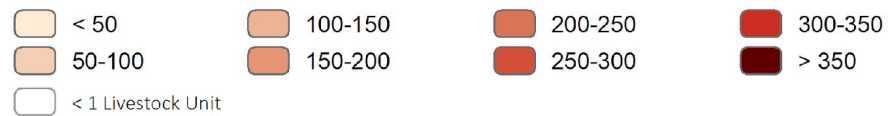
All upstream emissions at producing location

Total emissions are concentrated with areas with large ruminant herds

Global emission intensity



Emission intensity from all livestock per unit of protein from meat, milk, and eggs
(Kg of CO₂ eq per kg of protein)

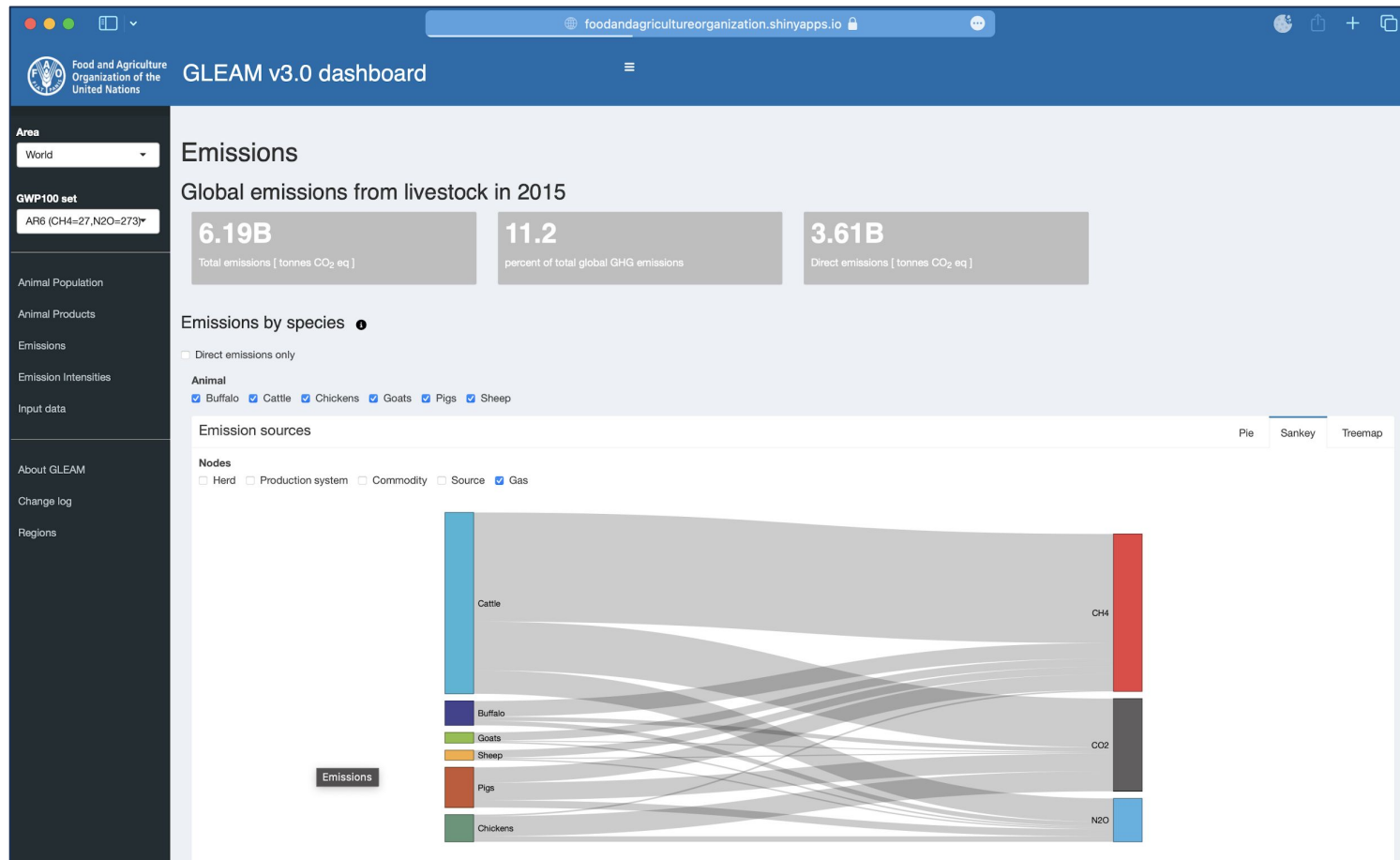


Relative emissions

High emission intensity in areas of low absolute emissions

GLEAM DASHBOARD

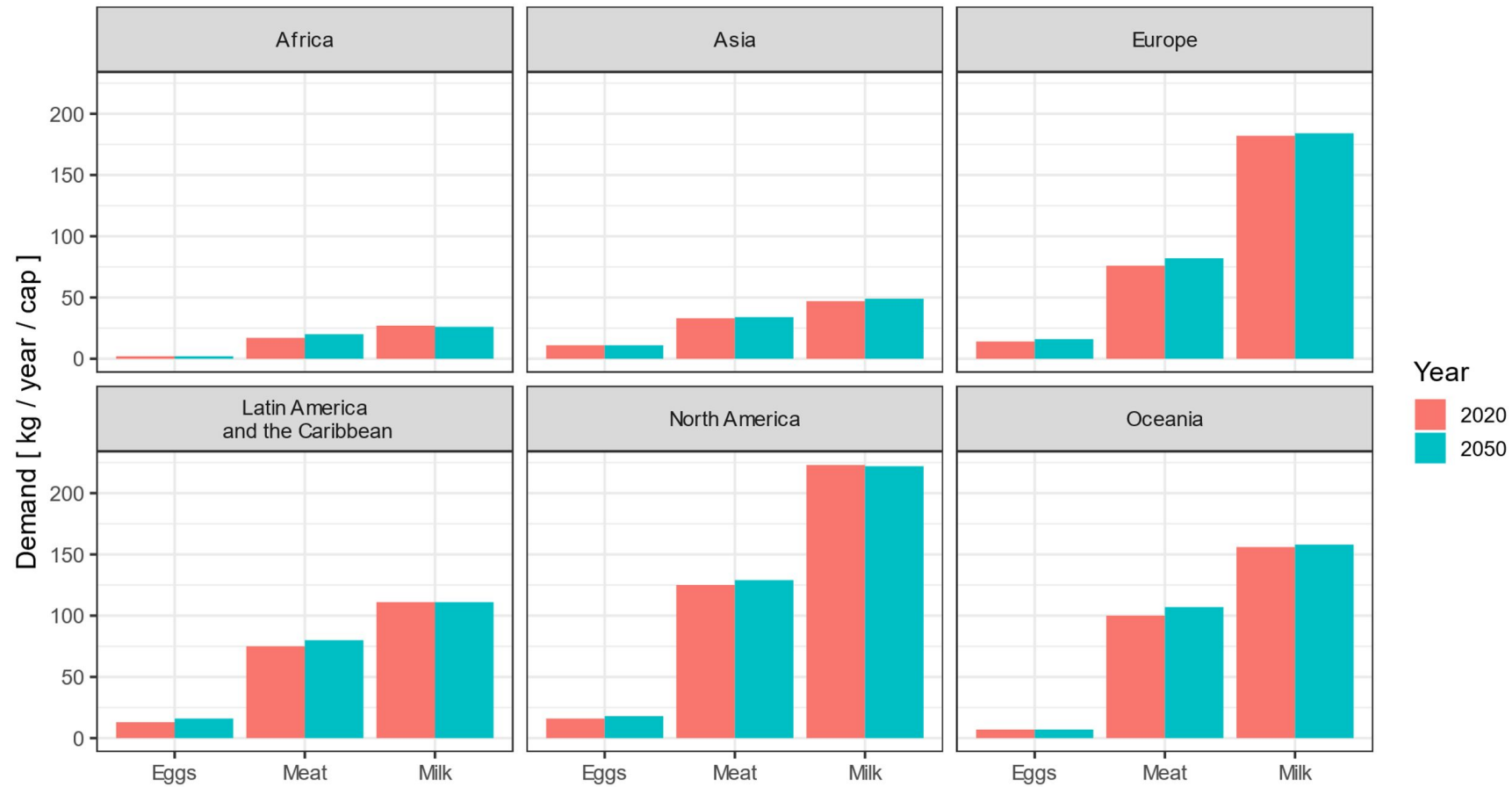
- Interactive online livestock data visualization and analysis



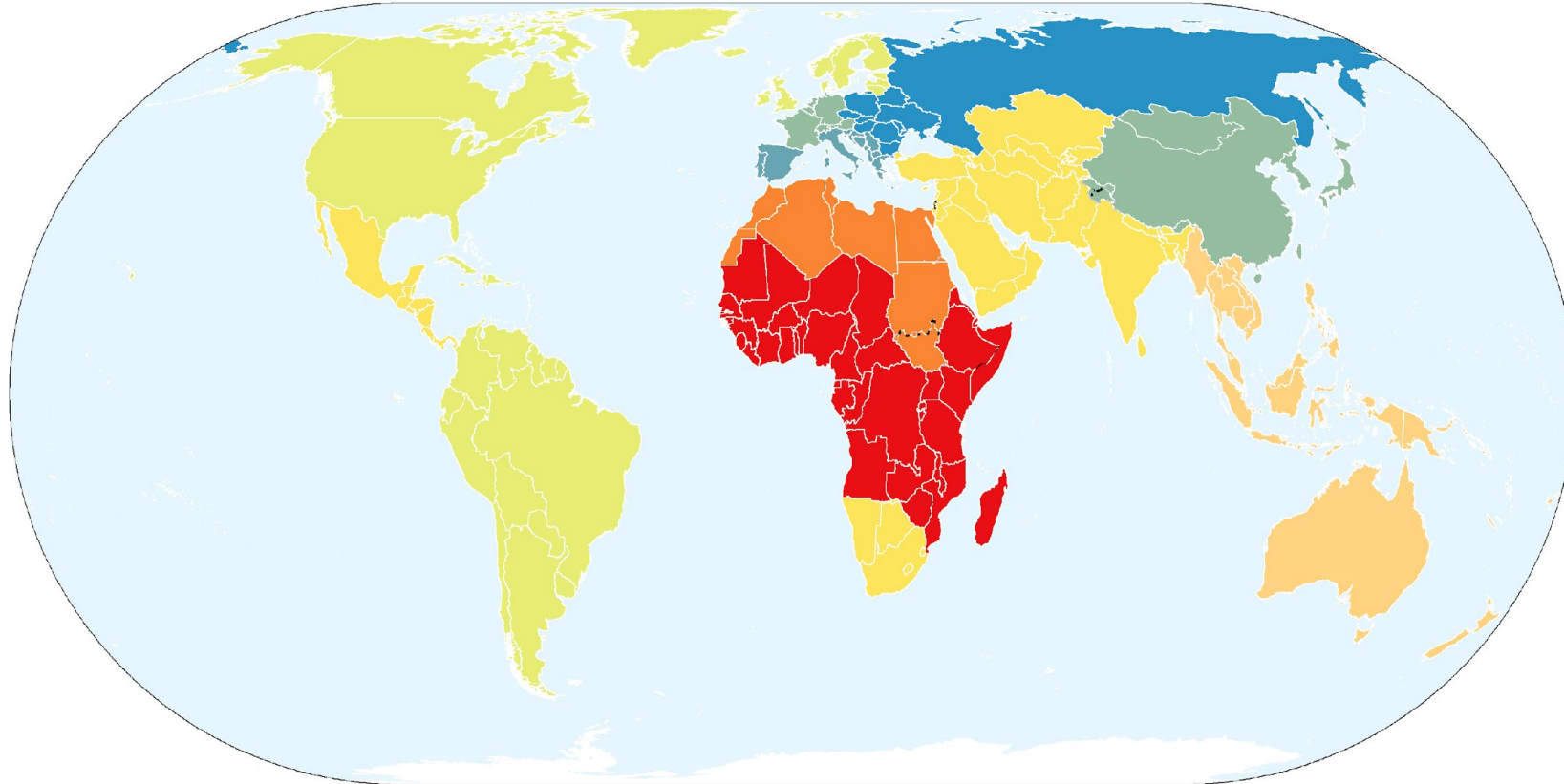
<https://www.fao.org/gleam/dashboard/en/>



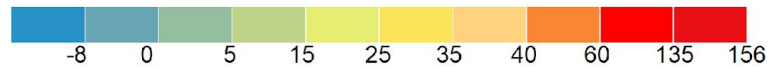
Projections of per capita demand for meat, milk, eggs



Projections of per capita demand for animal protein



Percentage change in animal protein demand, 2020-2050

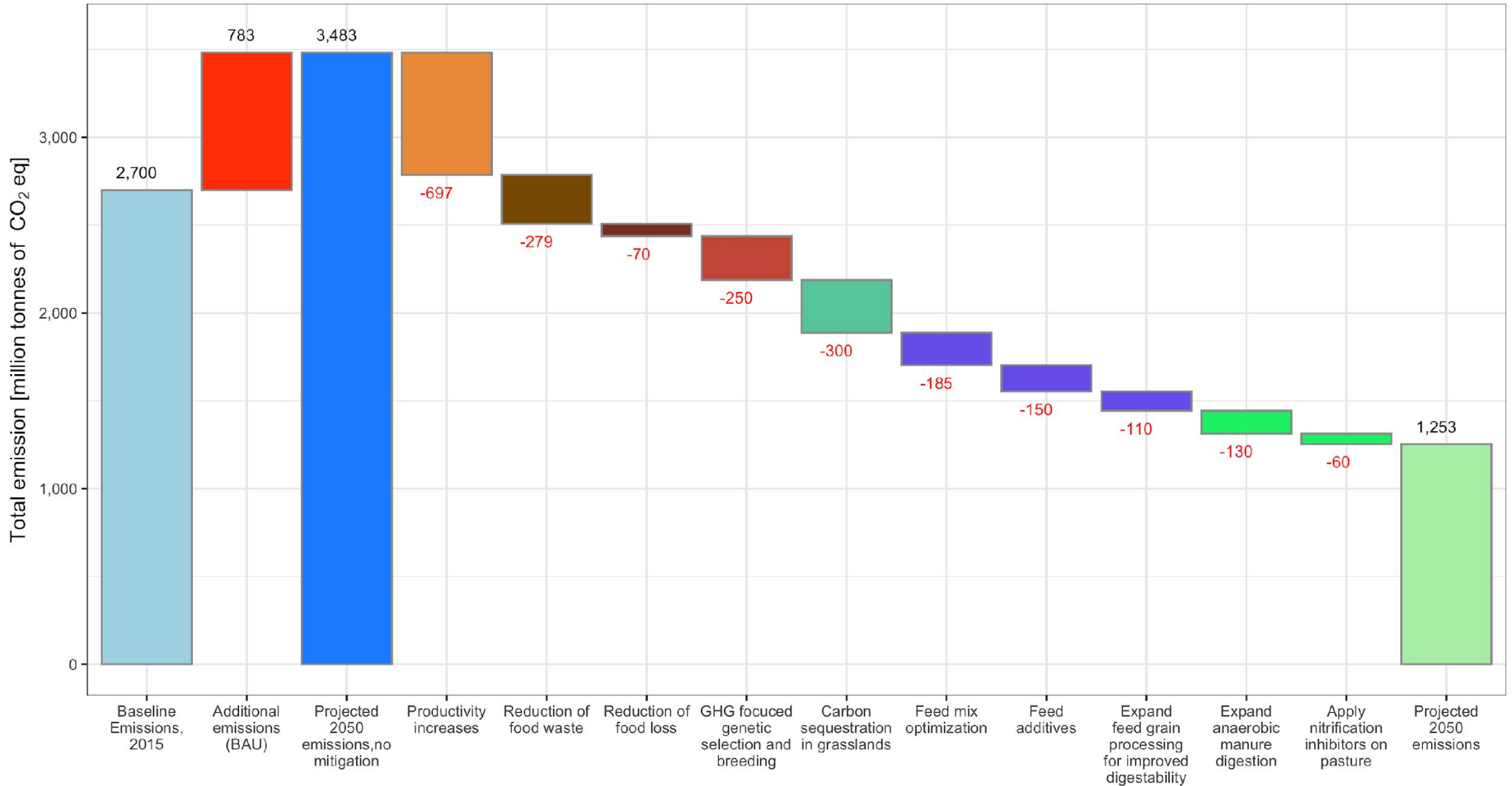


+ 20 % animal protein production required by 2050 globally

Ongoing projects

- PADNET
 - Pathways to Dairy Net Zero in Dairy in East Africa
 - Partners : IFAD, ILRI, ..
- NZAGR/GDP dairy net zero initiative
 - Global warming impact of dairy systems
 - Dairy mitigation case studies representative of global LPS
 - UK, Uruguay, India, Kenya
 - Barriers to mitigation and scenarios of uptake rates

Mitigation pathways



Pathways to Dairy Net Zero



Dairy sector program design underway for Kenya, Rwanda, Tanzania and Uganda enabled by \$3.5 million project preparation facility from the Green Climate Fund in partnership with IFAD, UN FAO, and the Global Dairy Platform

Developing a **public-private partnership approach with \$400 million blended finance** to support the transition of the region's dairy systems to lower emissions and climate resilient pathways

Project objectives:

- 1 Reduce methane emissions of dairy farming** per unit of product and in absolute terms
- 2 Enable Dairy Farmers to adapt** their livestock production and management systems to be more climate resilient
- 3 Reduce losses of milk and GHG emissions** in the production and distribution process

Co-benefits: **Rural employment and income** (incl. via increased demand for feed and fodder), **household resilience against climate shocks** (via increased incomes), **food security** (via increased dairy consumption), **national and regional economic development** (via increased investments in dairy), and **accentuation of the benefits of other IFAD and GCF projects** (via integration with other projects)



FAO Investment Center and IFAD lead coordination and design



Tanzania



Uganda

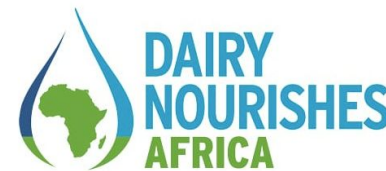


Kenya



Rwanda

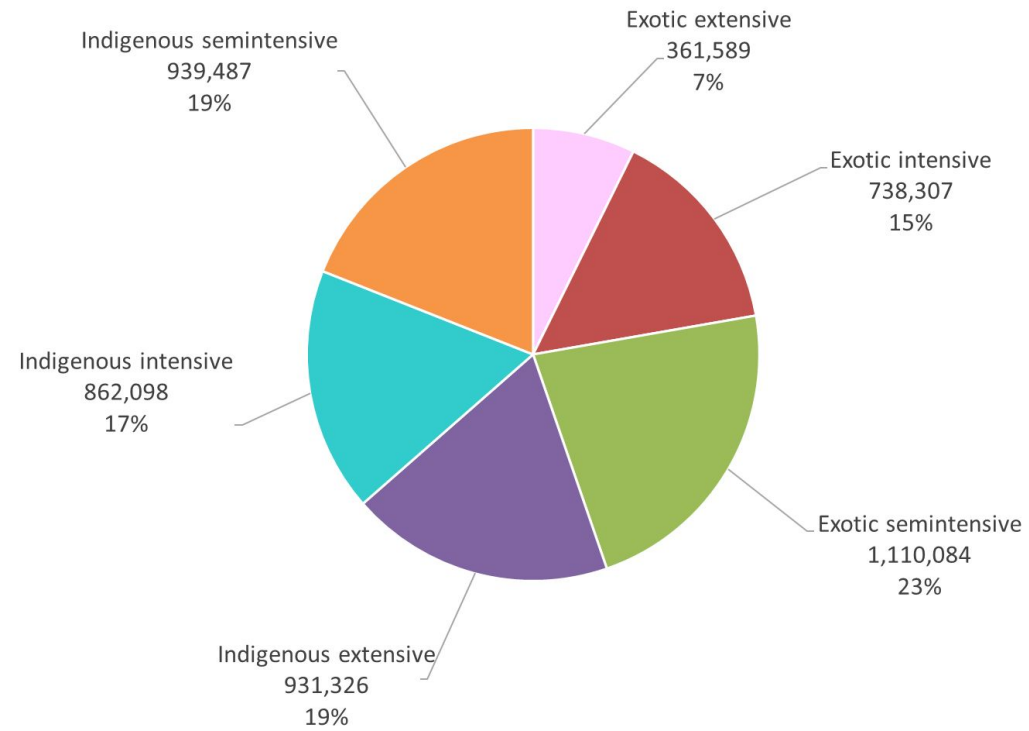
Government Ministries and Dairy Boards inform and approve design



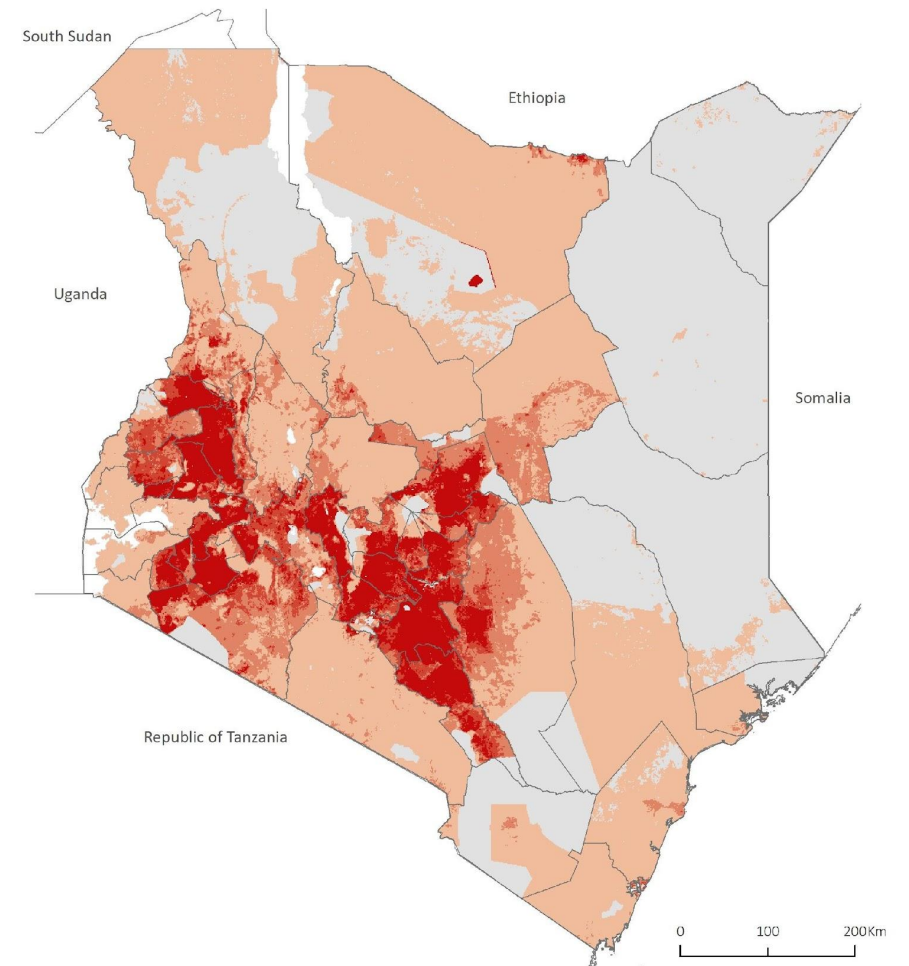
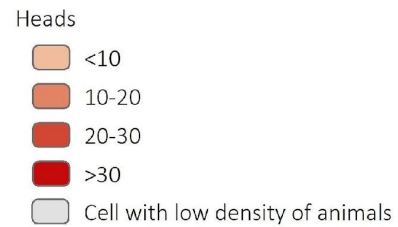
Produce studies and design elements



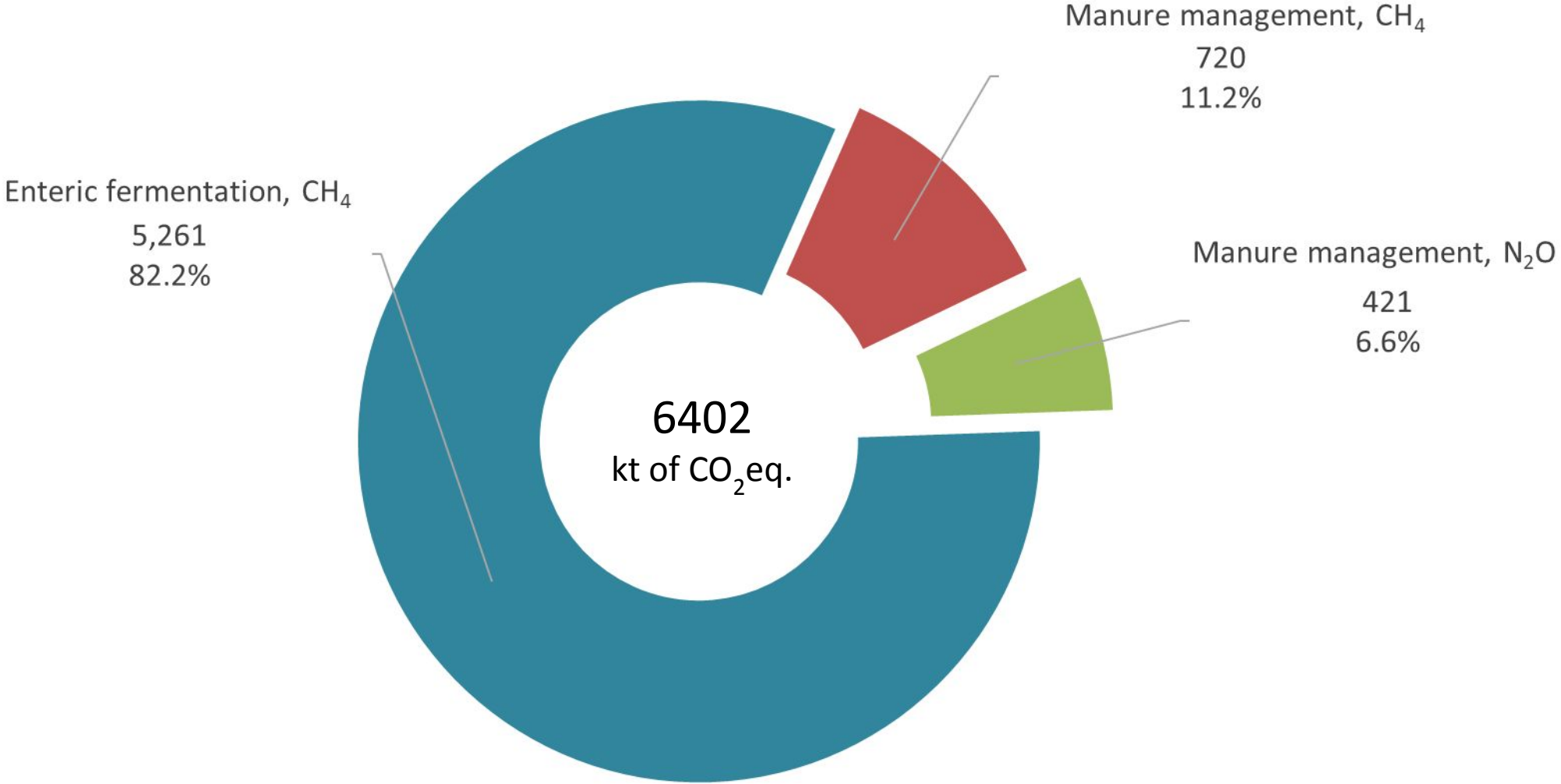
Dairy cattle population and distribution



Kenya dairy cattle population

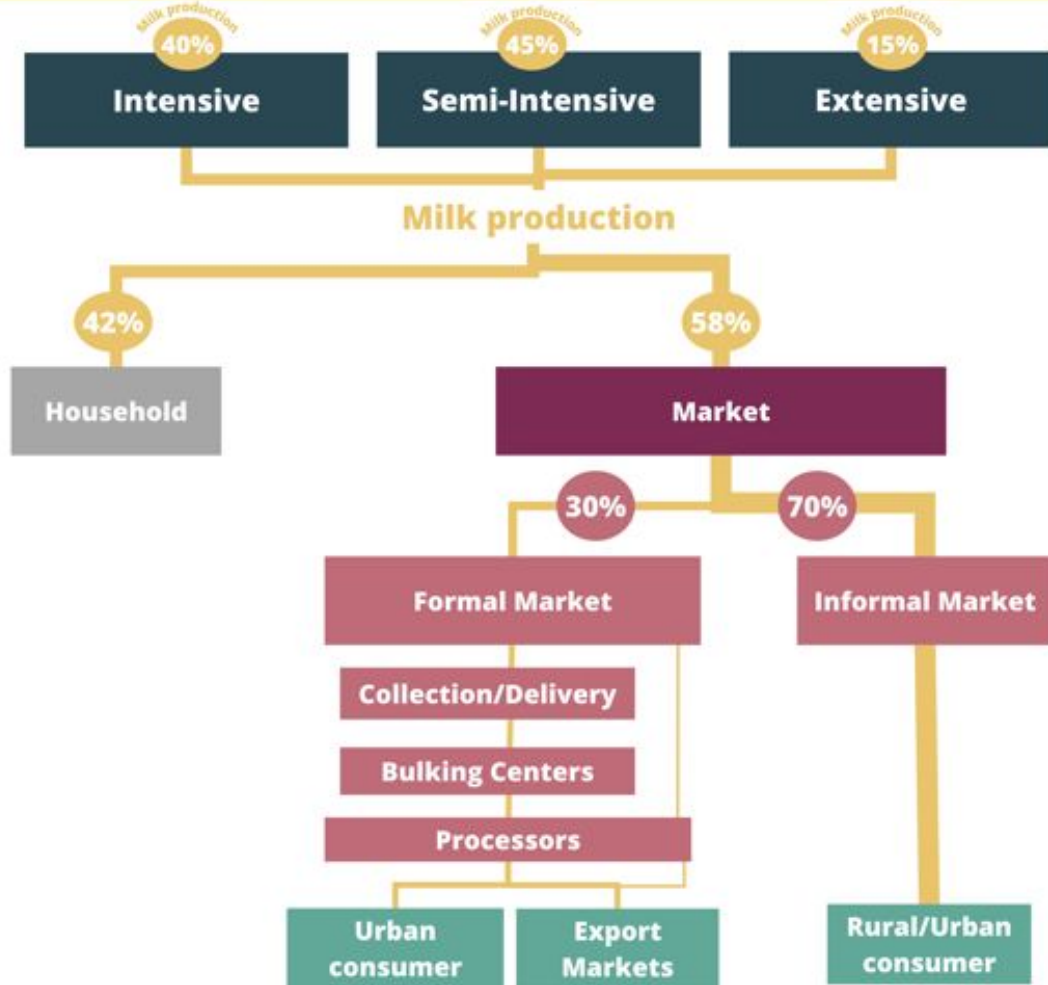


2019 - Total GHG direct emissions from Kenya dairy cattle

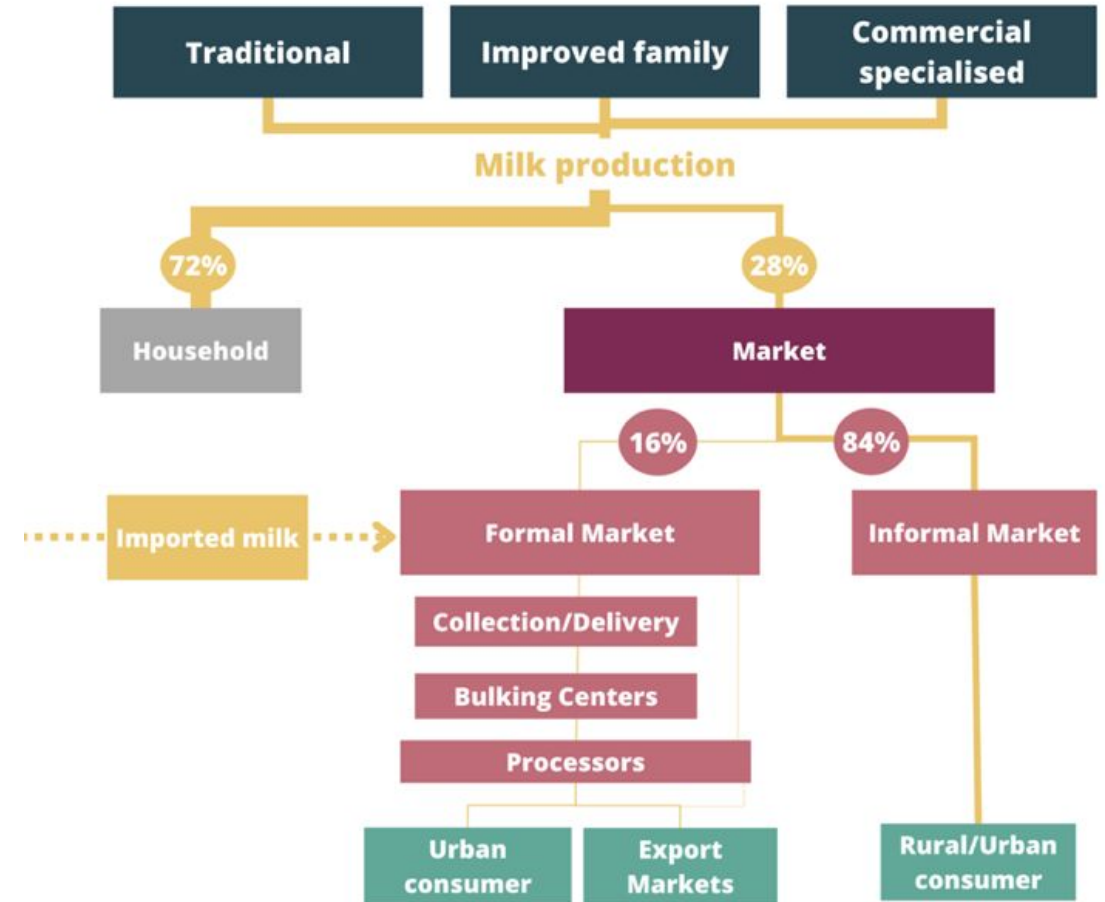


Dairy value chains

KENYA



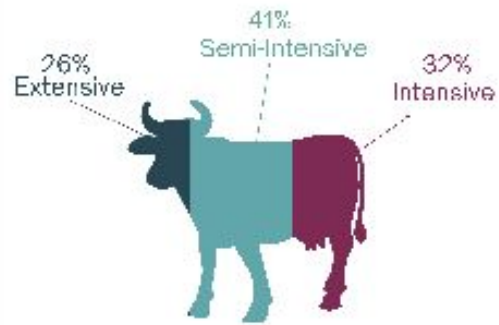
TANZANIA



Herd distribution

Kenya

Herd distribution

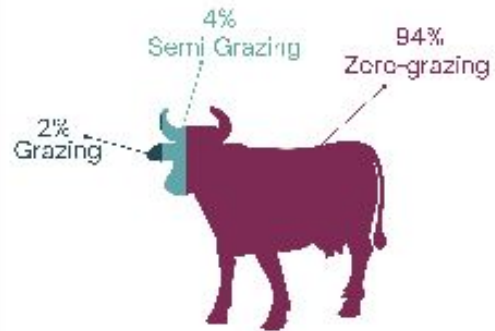


Milk production



Rwanda

Herd distribution

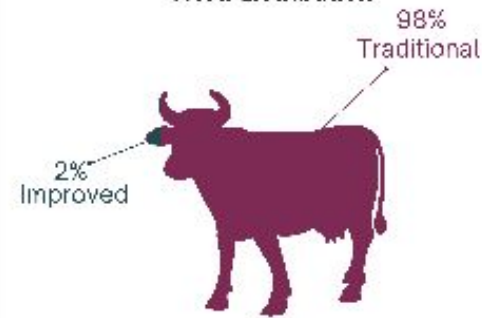


Milk production

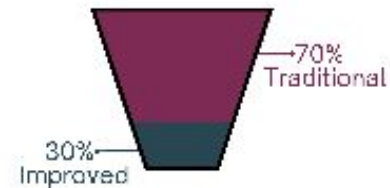


Tanzania

Herd distribution

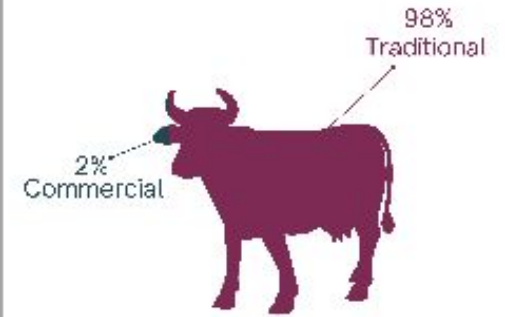


Milk production

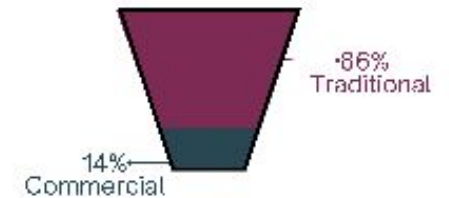


Uganda

Herd distribution



Milk production



Mitigation interventions	Policy	Strategy or Plan	
Animal Productivity	NLP NDC	NCCAP NCCRS NAP	
Animal breeding	NLP	NCCAP NCCRS NAP	
fodder conservation: Hay and silage	NLP	NCCAP NCCRS NAP KCSAS	NCCAP: National Climate Change Action Plan: 2013 -2017 NCCRS: National Climate Change Response Strategy
Supplementation with concentrates	NLP	KCSAS NAP	NIP National irrigation policy NLP: National livestock policy
Establishment of fodder grasses and legumes (grasses and trees)	NLP	KCSAS NAP	KCSAS : Kenya climate smart agriculture strategy 2017 – 2026 NDC : Nationally Determined Contribution
Grazing management	NLP NDC	NCCAP KCSAS NAP	
Water harvesting technologies	NIP	NCCRS NAP	
Biogas	NDC	NCCRS KCSAS	

Potential future research collaboration

- Manure data updates with ILRI
 - Pathways to Dairy Net Zero in Dairy in East Africa
 - Partners : IFAD, ILRI, ..
- NZAGR/GDP dairy net zero initiative
 - Global warming impact of dairy systems
 - Dairy mitigation case studies representative of global LPS
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 - Barriers to mitigation and scenarios of uptake rates

Thank you!



<https://www.fao.org/agriculture/animal-production-and-health/en>