RESEARCH PROGRAM ON Livestock

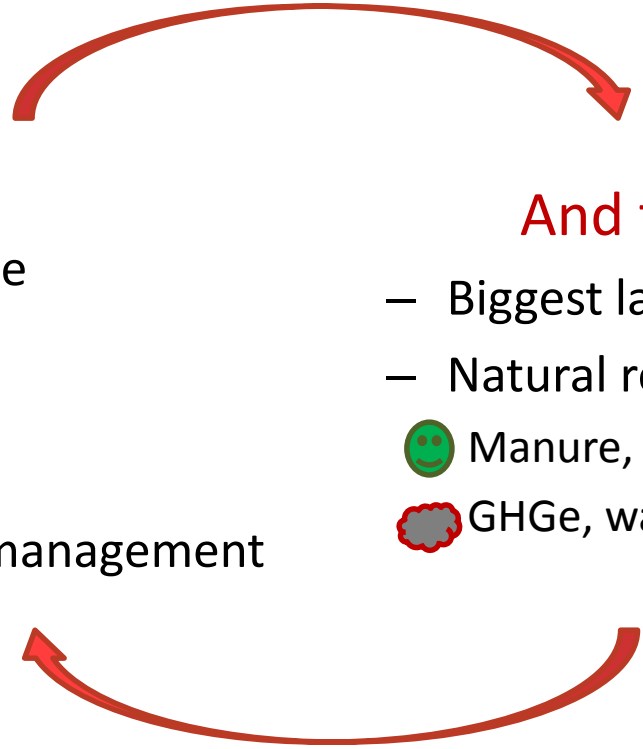
More meat, milk and eggs by and for the poor

Optimizing the environmental footprint of livestock production

An Notenbaert and Polly Ericksen

TropAg2017 Conference, Brisbane, 20-22 November 2017

THE IMPORTANCE OF LIVESTOCK



For PEOPLE

- Employment, income
- Economy
- Food and nutrition
- Cultural value
- Resilience and risk management

And the PLANET

- Biggest land user
- Natural resources:
  - Manure, carbon in the soil, energy, …
  - GHGe, water use/pollution, degradation,…

OECD narratives mostly negative
Not much evidence from Low-Middle Income Countries

<u>Sustainability is a big issue and needs to be managed</u>

THE AIM OF LIVESTOCK-ENVIRONMENT RESEARCH

Optimize the environmental footprint

i.e.

↑ “Goods” & “Bads“ ↓

CGIAR RESEARCH PROGRAM ON Livestock

THREE PILLARS IN THE RESEARCH PORTFOLIO

- Improved ***foresight and assessments*** (2-way GEC-livestock interactions) based on site-specific data
- Identify ***solutions*** and provide stakeholders with knowledge and incentives to implement solutions
- Foster an ***enabling*** policy and institutional environment

== GHGe, soil health/degradation, water, biodiversity ==

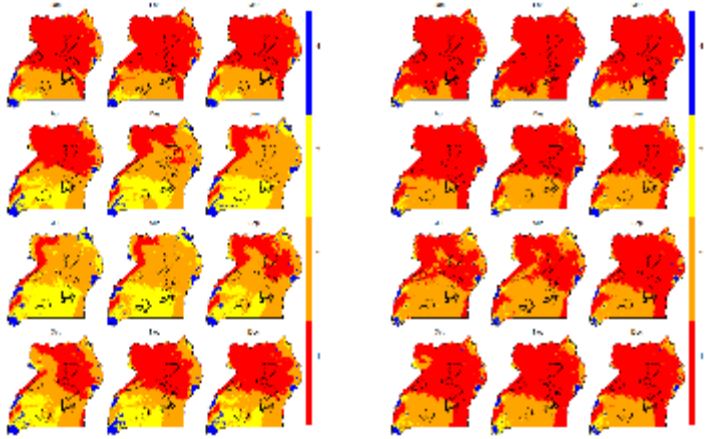
EXAMPLE 1: greenhouse gas emissions

Impacts of CC on Livestock

PILLAR 1: ASSESSMENTS

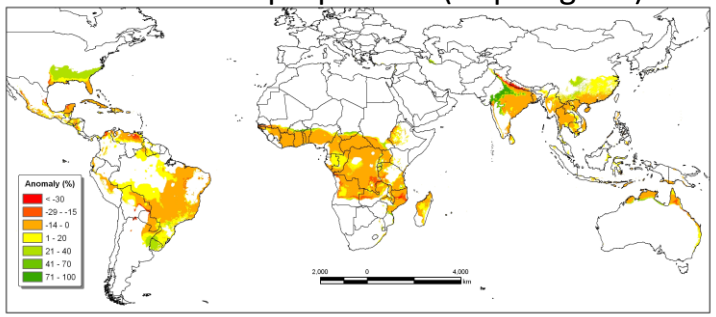
- Hazards/stresses:
  - Δ CO_2, temperature, precipitation
  - Variability and extreme events
- Direct impact
  - Heat stress
- Indirect impact
  - Water
  - Diseases
  - Biodiversity, Soil
  - Feed and forages
  - Livelihoods and systems

Heat stress change – 2010-2035:

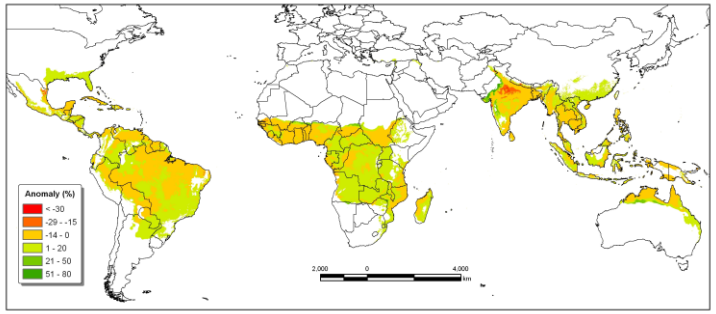


Suitability change – 2000-2020 (A2):

Pennisetum purpureum (Napier grass)



Brachiaria brizantha (Signal grass)



Ecocrop modeling (Hymann et al.)

GHG emission baselines and SSA-specific emission factors

PILLAR 1: ASSESSMENTS

- Tier 2 estimates of ruminant Emission Factors
- Difference due to assumptions about energy intake
  - Feed shortage/ seasonal LW loss
  - Caution: only one location
- Countries in stronger position for climate finance

Report	Region	Males	Females	Calves
		kg CH_4 yr^{-1}		
IPCC	Africa	49	41	17.3
Goopy et al. (2017)	Nyando, Kenya	34.4	24.6	16

IPCC approach

CH_4 = Energy intake* Y_m ("methane conversion factor")

Mazingira Centre

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Integrating forages in African farming systems

PILLAR 2: SOLUTIONS

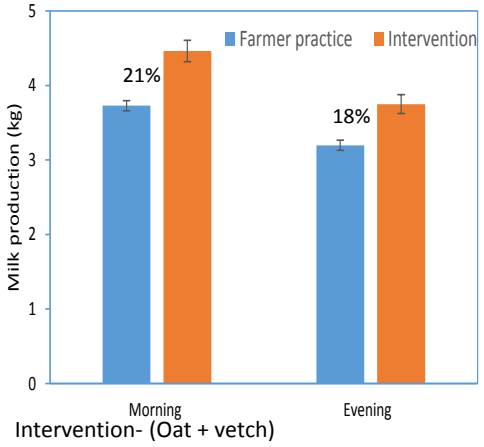
On-station:
- Kenya, Tanzania, Uganda, Mozambique
- Demonstration plots and long-term trials
- Grasses/legumes

→ Towards advanced lines of breeding program

On-farm:
- Napier, Brachiaria, *Desmodium* in Tanzania
- Oats, Rye grass, Vetch in Central Kenya
- Grasses/legumes in Rwanda and Tanzania


Establishment demonstration


Brachiaria



Intervention- (Oat + vetch)


Fodder oat for cold areas


Vetch- legume


Napier- Desmodium intercrop

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EXAMPLE 2: Restoring degraded rangelands

Estimating SOC dynamics in a rangeland of Eastern Kenya - A DayCent model approach

PILLAR 1: ASSESSMENTS

- Soils as carbon sink
  - Mitigate CC
  - Improve soil fertility
- Rangeland sequestration potential
  - Improved management practices
- DayCent SOM model
  - Predicts SOC dynamics over time

NPP Estimation

Soil Properties

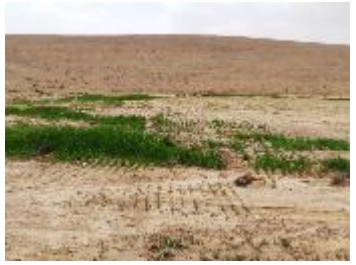
DayCent Site Specific Parameters

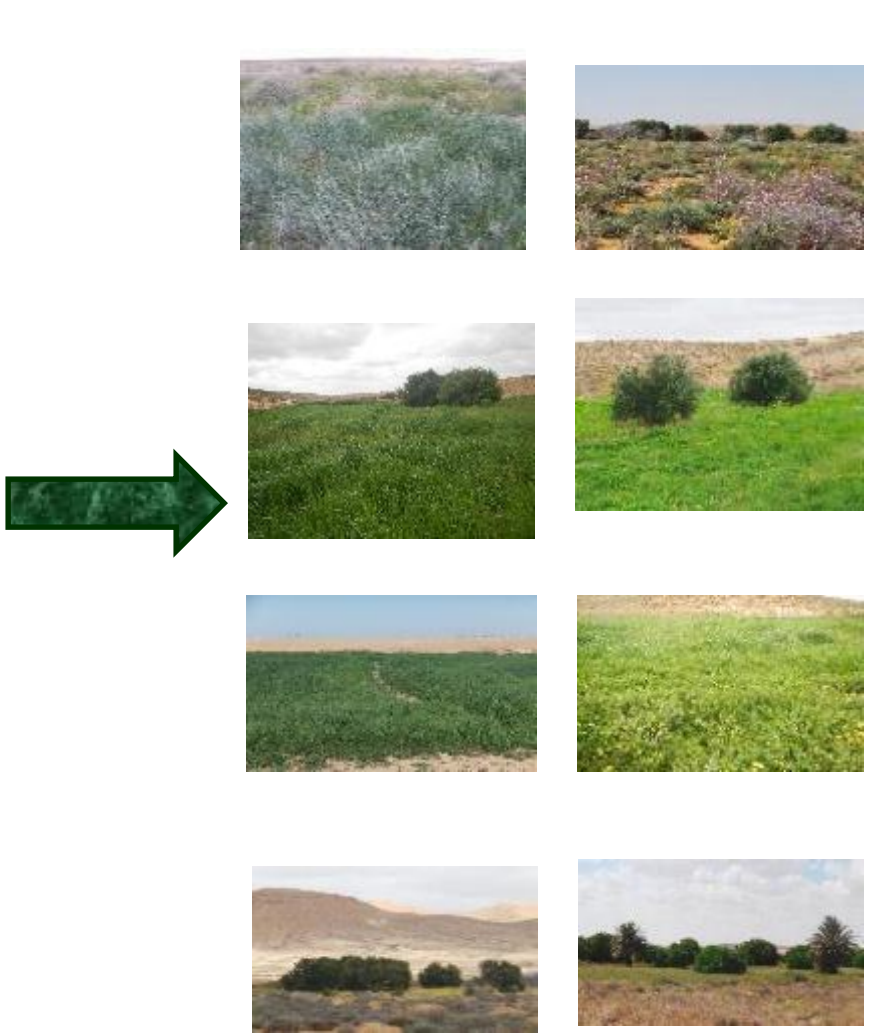
MSc. thesis by Kate Blankson

PILLAR 2: SOLUTIONS

Solutions

1 Booklet (practical guidelines) on Sustainable Development of Lowland Pastures in NENA region





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Exclosure improvement:
influence of context

PILLAR 2: INSTITUTIONS

CGIAR Research Program on Livestock

livestock.cgiar.org

The program thanks all donors and organizations which globally support its work through their contributions to the CGIAR system

The **CGIAR Research Program on Livestock** aims to increase the productivity and profitability of livestock agri-food systems in sustainable ways, making meat, milk and eggs more available and affordable across the developing world.