Towards a sustainable dual-purpose cattle value chains in Nicaragua

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CIAT

CGIAR Research Program on Livestock and Fish

The livestock sector in Nicaragua

- Major pillar of the economy + increasing demand (Human population growth, urbanisation, raising incomes)

→ opportunity for **income** and **employment** generated along the VC

- Extensive low-yield production leading to soil degradation, deforestation and a shift of the agricultural frontier towards the vulnerable Caribbean region

→ Livestock-related interventions have a great potential to **mitigate GHG emissions** and **recuperate degraded soils**.

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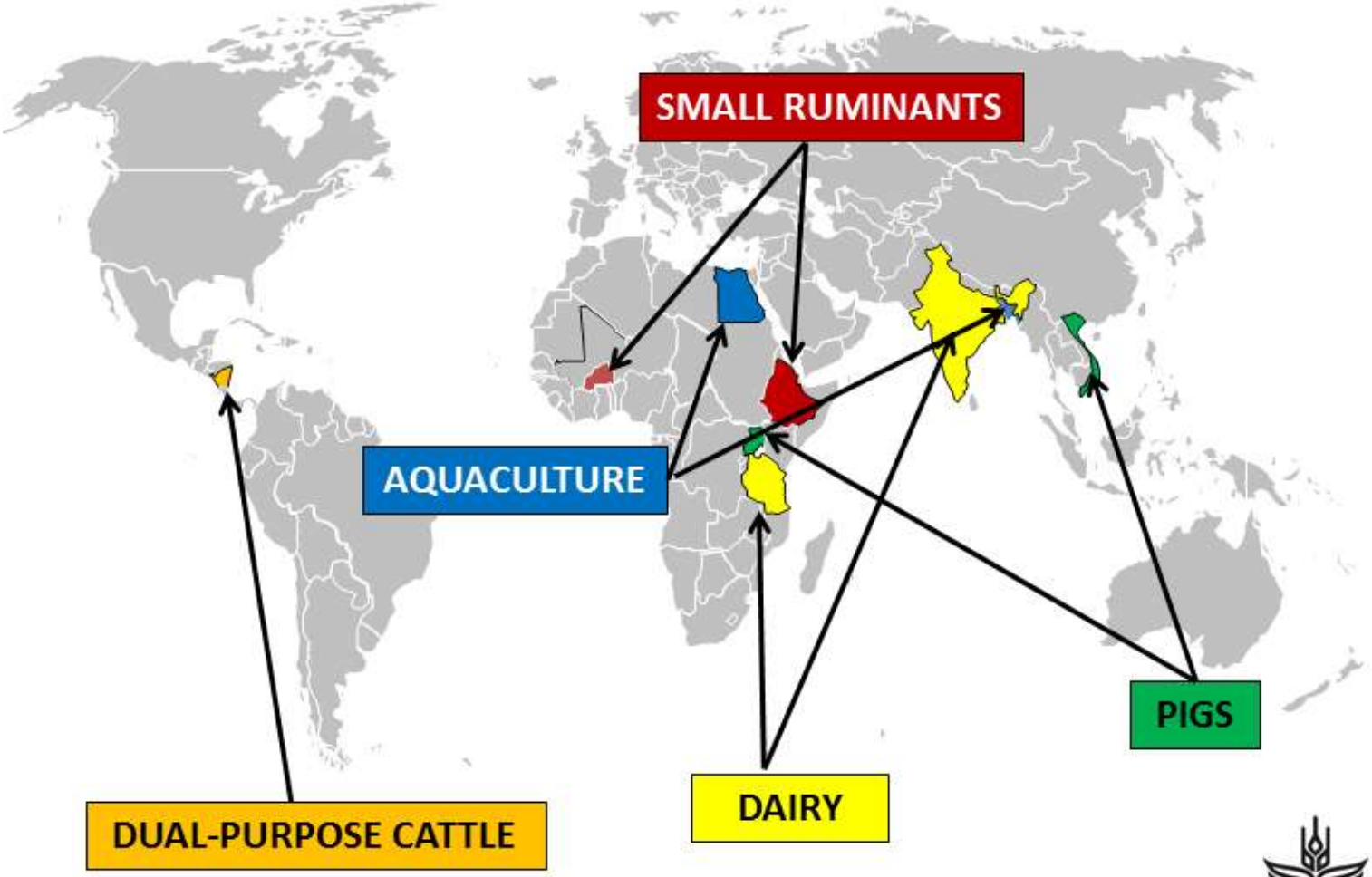

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- → Pro-poor transformation of animal-sourced food value chains

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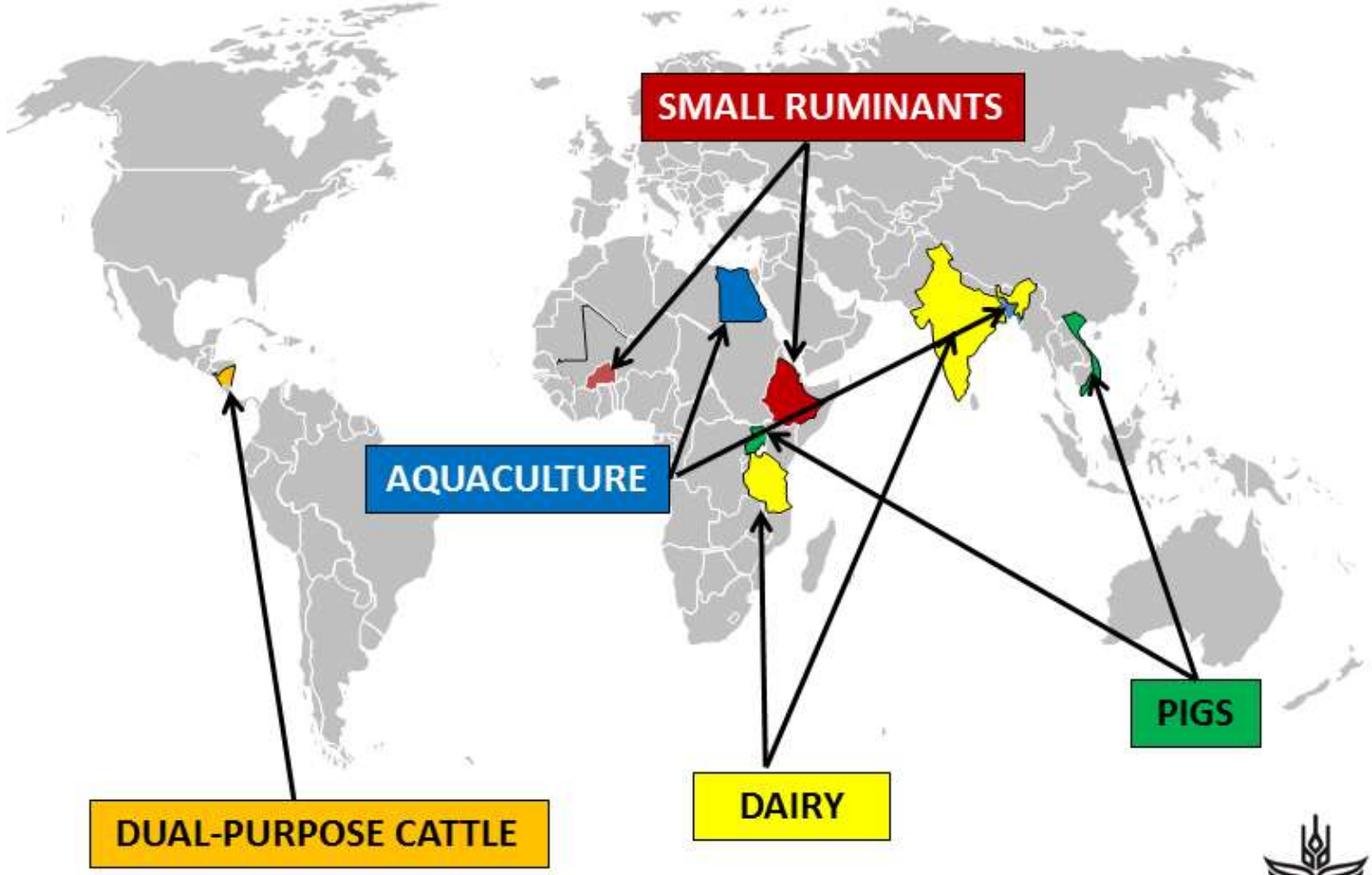

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→**Sustainable** transformation of animal-sourced food value chains

Including environment through rapid ex-ante assessments ~ the CLEANED framework

Building blocks

1. Value chain concept in local context
2. Stocks and flows across scales
3. Environmental impact and pathways
4. Key indicators

Step-wise procedure

A. Setting the baseline

B. Ex-ante assessment

BILL & MELINDA GATES foundation

Environmental impacts along value chains

1. Feed cultivation/ Grazing land man.

2. Livestock rearing, including manure man.

3. 'Multiplied' by losses/waste, along the value chain all the way to actual consumption

Greatest environmental impacts = 1 + 2

Participatory GIS

- Aim:
  - Collect and calibrate spatially-explicit data
  - Explore scenarios of change
  - Assessments produced aligned to and rooted in local understanding

- Resulting maps (with qualitative descriptions):
  - Different production systems
  - Environmental resources (status and risk)
  - Brainstorm on livestock intensification scenarios

- Complemented by data from baseline surveys, lit.

Farming system description

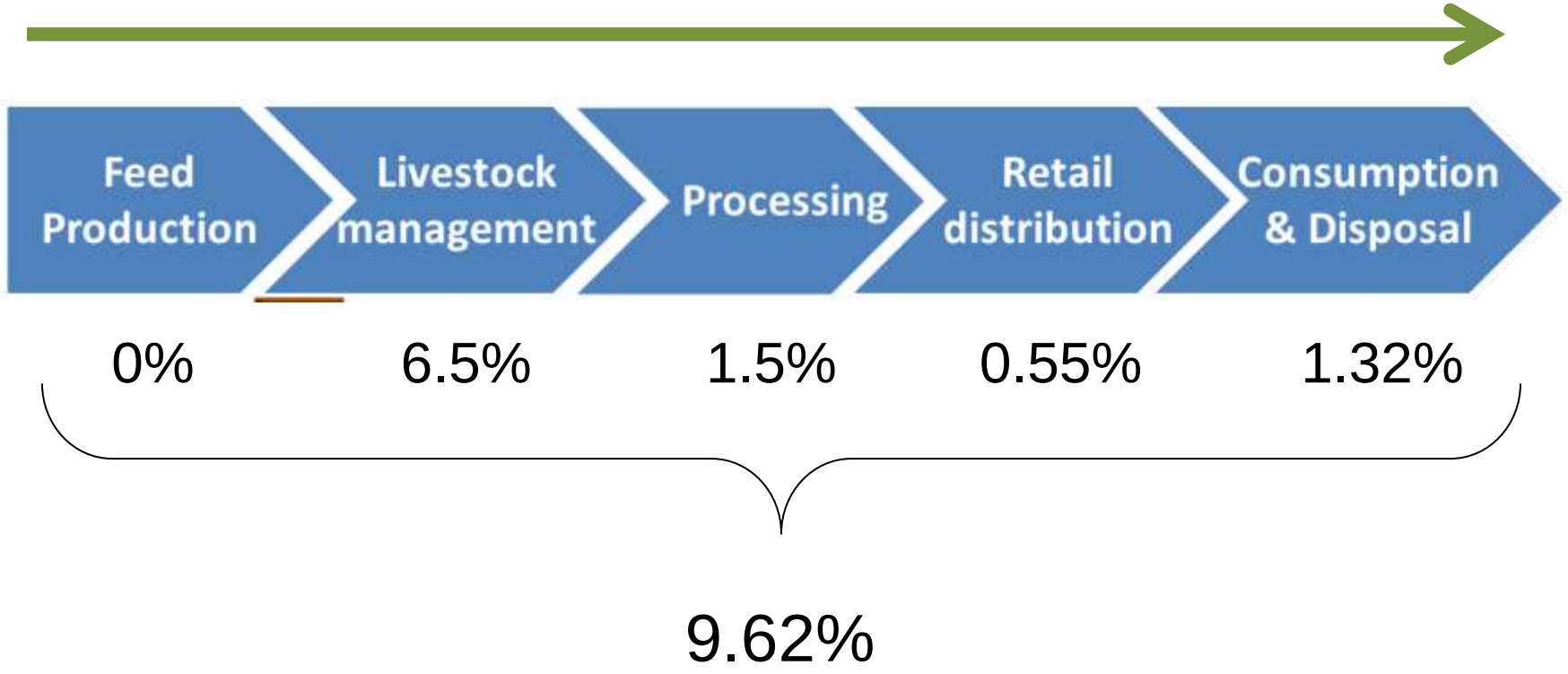
Livestock herd and productivity, manure management, feed basket, fertilizer input, residue management

Livestock category	No.	Annual milk production (l/animal/yr)	Time spent in stable (fraction of day)	Time spent in non-roofed enclosure (fraction of day)	Time spent grazing on-farm (fraction of day)	Time spent grazing off-farm (fraction of day)
Local dairy cows	8	700	-	0.65	0.35	-
Improved cows	-	-	-	0.65	0.35	-
Other adult cattle	14	-	-	0.65	0.35	-
Calves	8	-	-	0.65	0.35	-

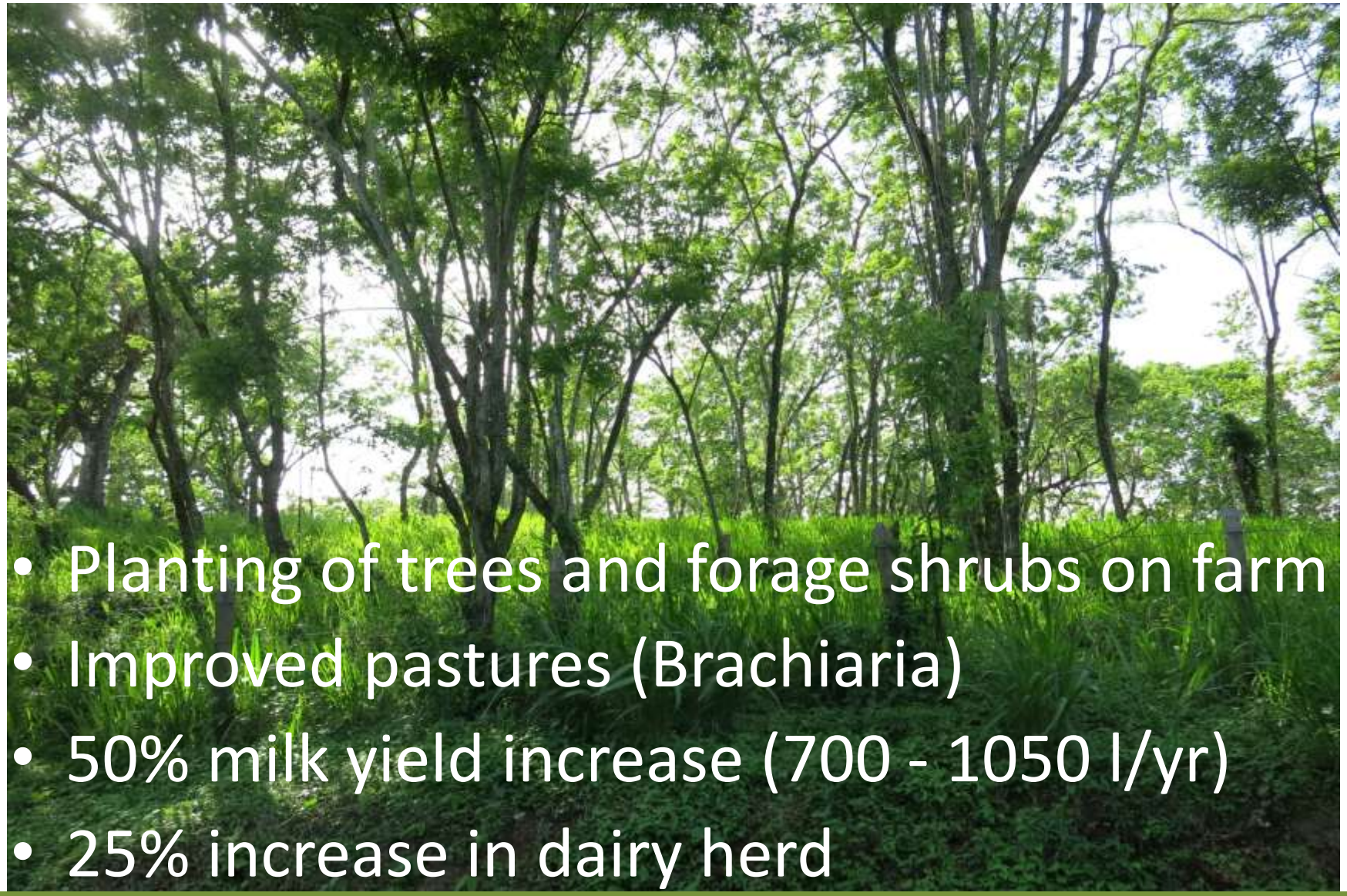
	proportion of feed item in feed basket (%)	
	wet season	dry season
Traditional pastures	100%	40%
Maize (Zea mays) - crop residue	0%	10%
Napier grass (Pennisetum purpureum) - green fodder	0%	50%

Losses along the VC

Waste/loss as a "multiplying factor"



Scenario of change: intensification



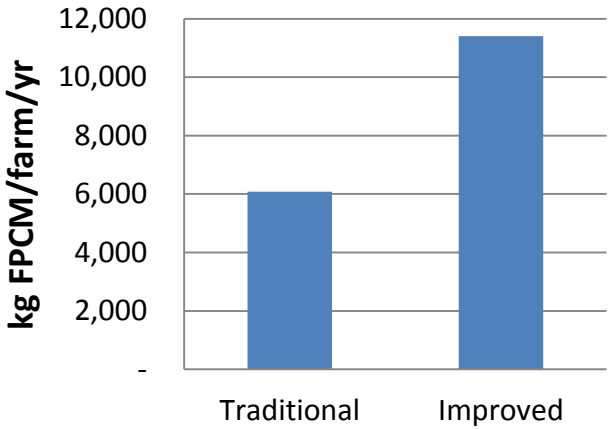
- Planting of trees and forage shrubs on farm
- Improved pastures (Brachiaria)
- 50% milk yield increase (700 - 1050 l/yr)
- 25% increase in dairy herd

Rapid ex-ante assessments

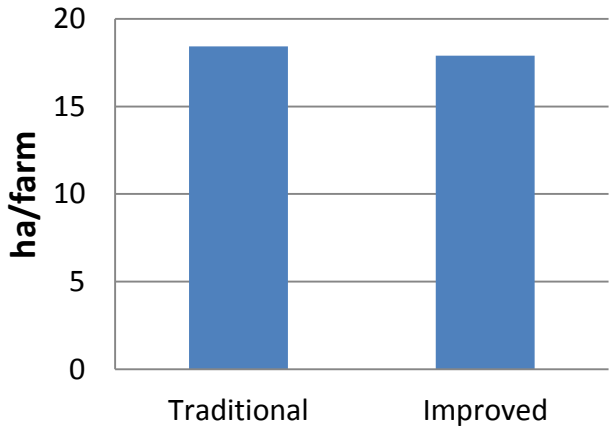
1. Productivity:
   - Area dedicated to feed production
   - kg FPCM/ha/yr
2. Soil health:
   - Soil erosion - RUSLE
   - Nutrient balance (N) - NUTMON
3. GHG emissions:
   - Total emissions of methane, nitrous oxide, carbon dioxide - IPCC Tier 1 and 2

Productivity

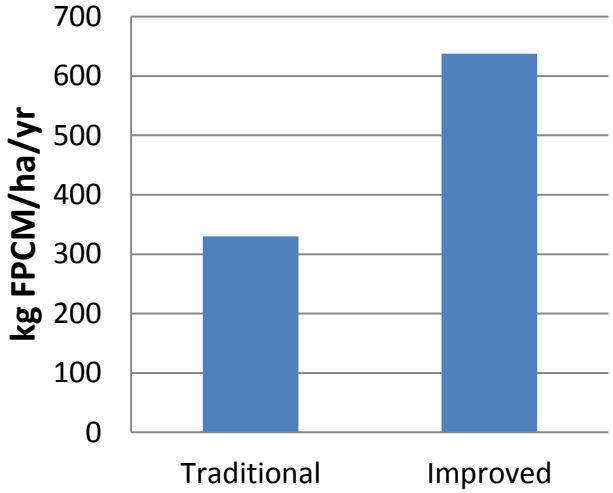
Milk production (min. waste) increases



Area for feed production reduces



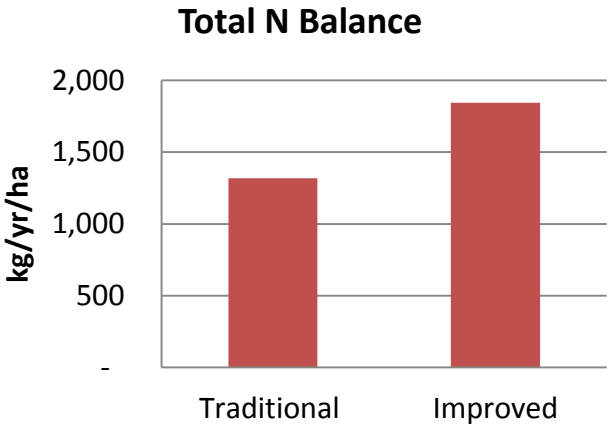
Productivity improves

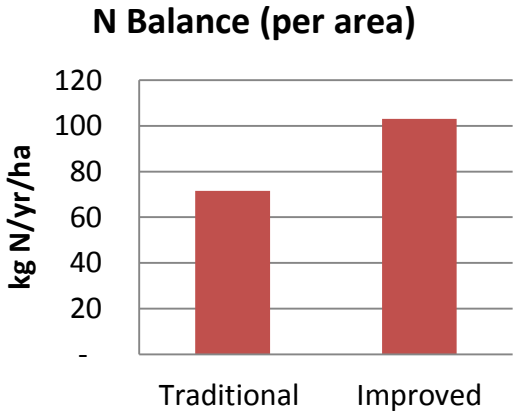


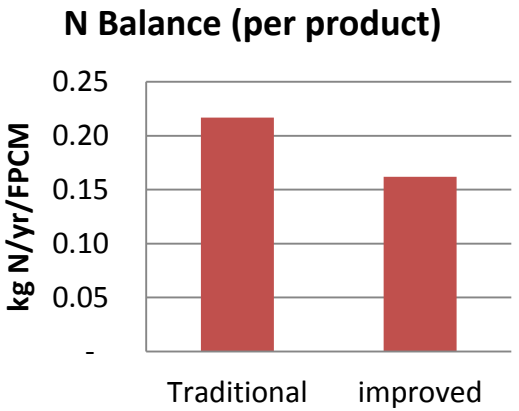
Soil and land health

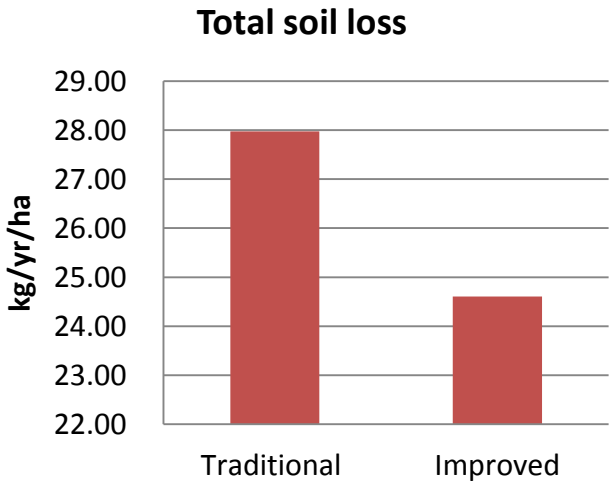
N Balance increases, but not if expressed per product

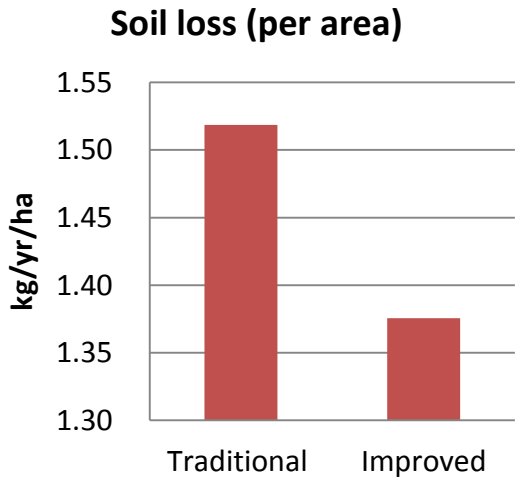
Soil loss decreases

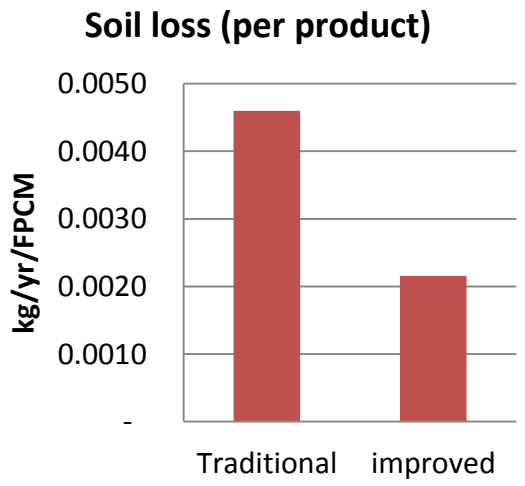




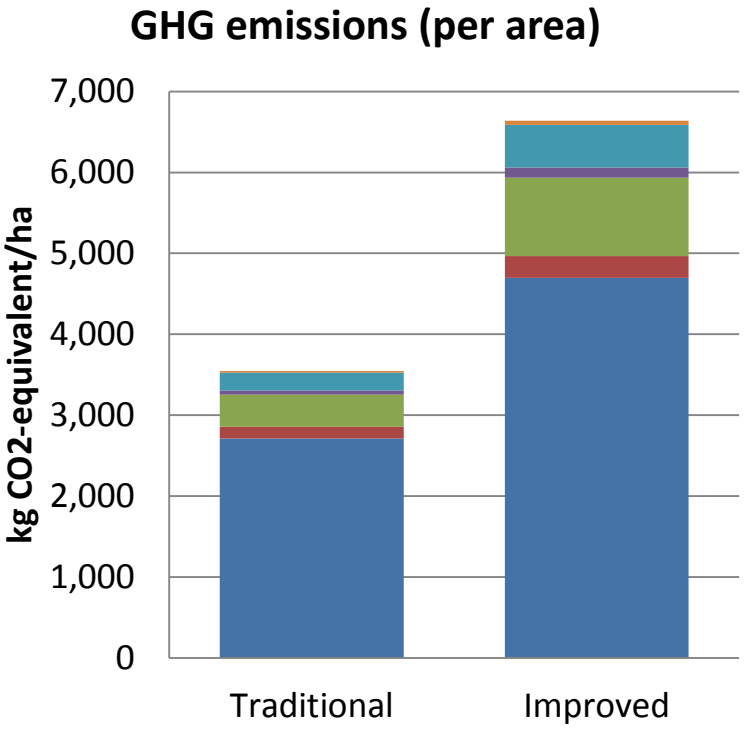


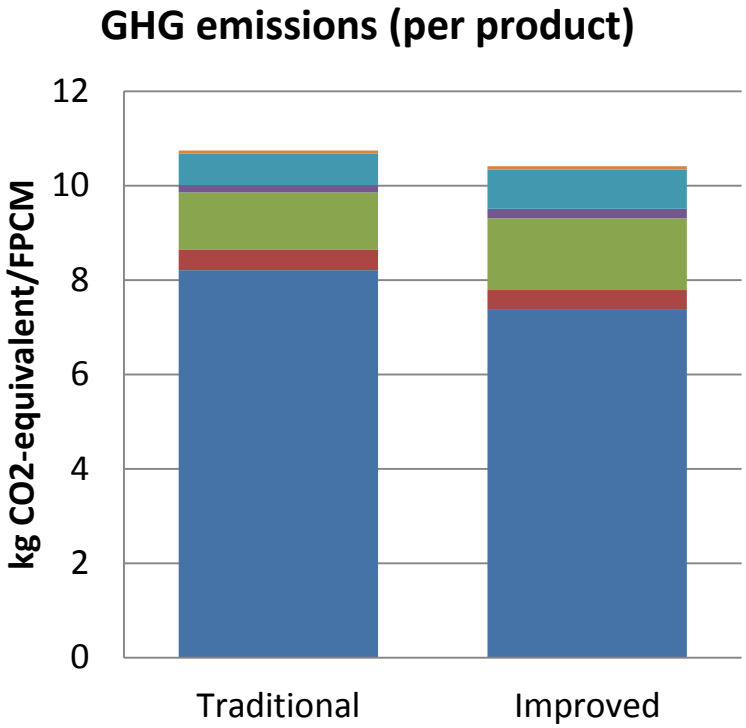






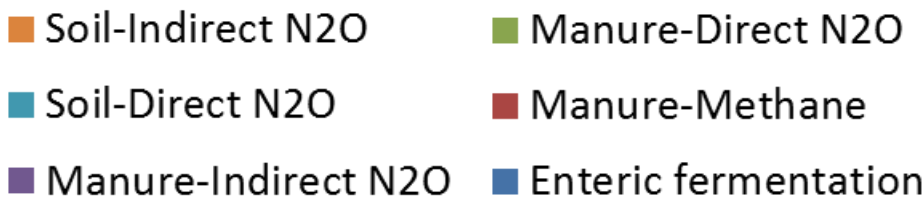
Green house gas emissions





Difference is partly offset by carbon stock change in woody biomass:

i.e. +/- 2000 kg CO_2 eq/ha



So…

- There is an opportunity to increase the farms' milk production and thus to respond to the increasing demand
- Increasing the productivity (per land area) contributes to efforts to curb expansion in forested areas (+ increase the number of trees in the landscape)
- Total GHG emissions would increase, while EI would reduce

Next steps

- Add water and biodiversity indicators
- Add more sites, farm types and intervention scenarios
- Ground-truthing through stakeholder feedback and field visit
- “out-scale” to full VC

- Feed results into the decision-making processes

- Make the tools more user-friendly for participatory running of scenarios (+ spatially explicit)
- Add/adjust metrics

Thank you!

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