

CIAT's Tropical Forages Program

CLEANED-X tool



An Notenbaert

GFP Workshop
12th November 2018
Kapiti, Kenya



Potential contributions to GFP

- Data from the Long-term trials
- “CLEANED” environmental assessments

CIAT's ongoing long-term trials in Western Kenya

Conservation Tillage ("CT1")

- since 2003
- test the impact of:
 1. **Tillage**: conventional tillage vs. zero-tillage
 2. Maize stover **residue** retention
 3. Maize mono-cropping vs. maize intercropped with soybean, and maize-soybean **rotation**, aliased with various levels of N and P **fertilizer** application
- **split-split-split plot design, 48 treatments, 4 reps, 192 plots**

Integrated Soil Fertility Management ("INM3")

- since 2004
- test the impact of:
 1. Application of farm yard manure (**FYM**)
 2. Maize stover **residue** retention
 3. Maize mono-cropping vs. maize intercropped with soybean, and maize **rotation** with *Tephrosia candida*, aliased with various levels of N and P **fertilizer** application

Conservation Tillage ("CT1")



Integrated Soil Fertility Management ("INM3")



Thika LT

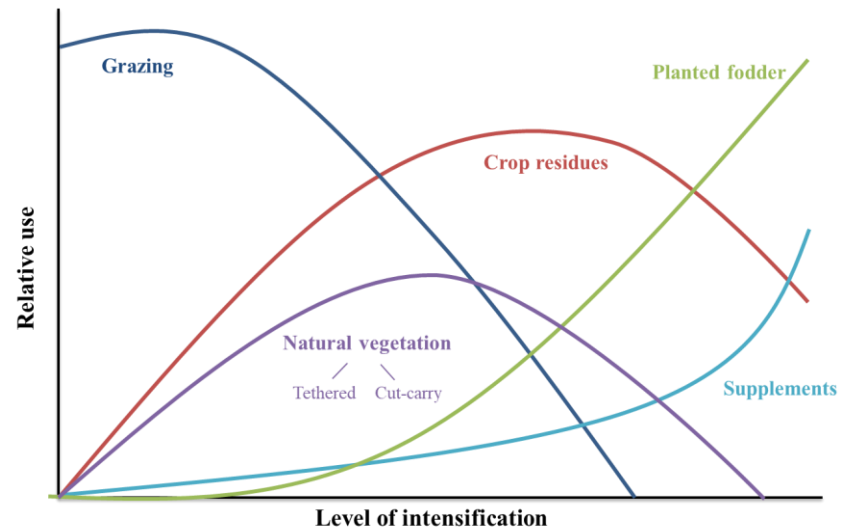


CLEANED X: minimum-data environmental ex-ante assessment tool

1. Production (absolute and per ha)
2. Land requirement for feed production (ha, ha/kg product)
3. GHG emissions (absolute, per ha, per kg product, per protein)
4. Soil health (Erosion, NUE, % area leached, % area mined)
5. Water use (absolute, per ha, per kg product, per protein)
+ simple Cost/Benefit calculations

CLEANED X: minimum-data environmental ex-ante assessment tool

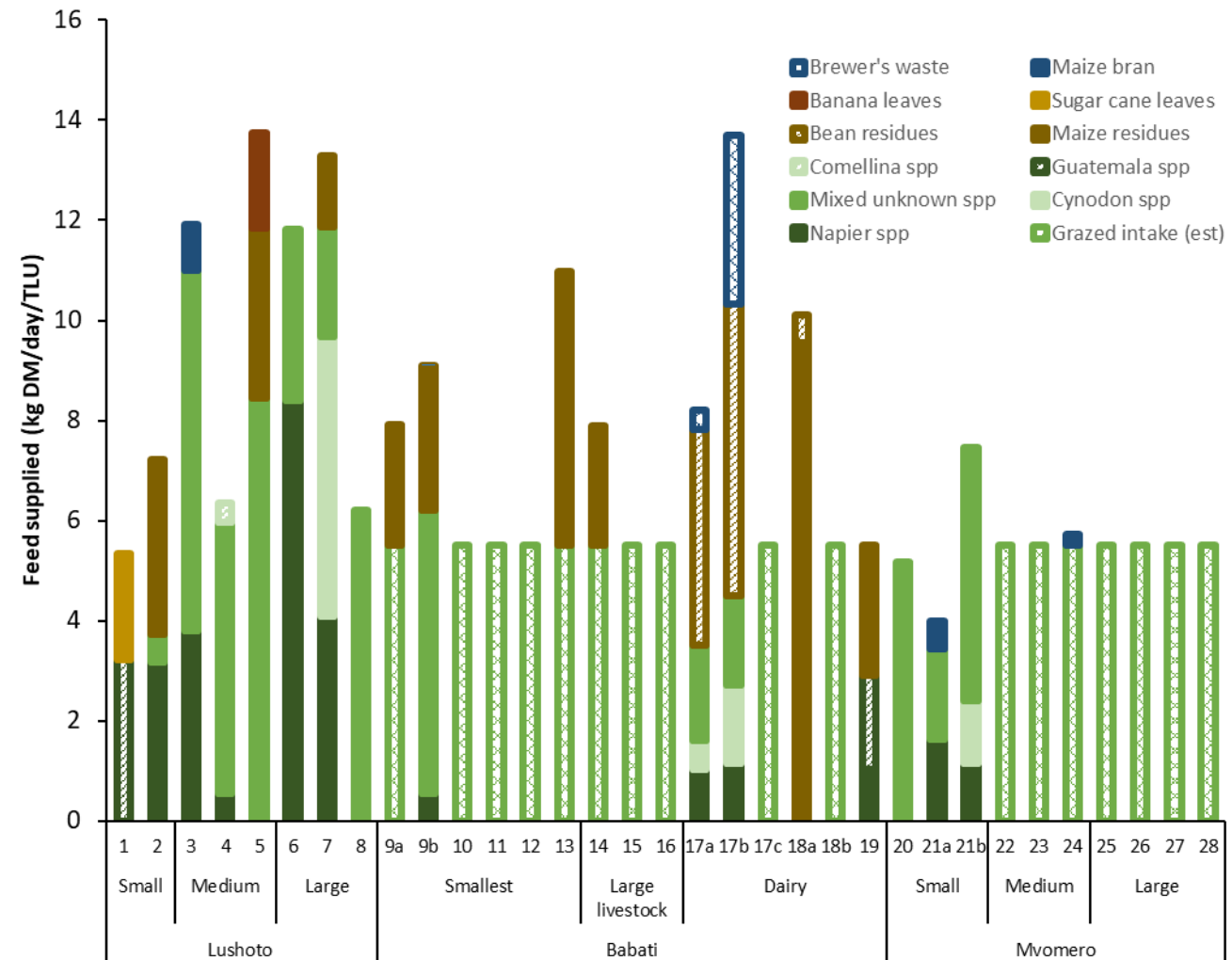
Core of the model: feed basket descriptions (dry and wet season)



Triangulation between PGIS info, survey data and expert opinion

→ Large uncertainty!

Therefore: more detailed feed baskets being measured



CLEANED X: Case study in Lushoto, Tanzania

		Productivity		Land requirements		Erosion			Nutrients			GHG emissions		
		Total supply (FPCM)	Productivity (FPCM/ha)	Land used (ha)	Land used per product (ha/MT FPCM)	Soil lost (kg)	Soil lost per area (kg/ha)	Soil lost per product (kg/MT FPCM)	N lost (kg)	N lost per area (kg/ha)	N lost per product (kg/kg FPCM)	Total emissions (kg CO2-eq)	Emissions per area (kg CO2-eq/ha)	Emissions per product (kg CO2-eq/MT FPCM)
Mixed crop-livestock enterprise	Genetics		-	-	-	-		-	-		-	-		-
	Feed	+++	+	---	+	---	+	++	---	+	++	---	-	
	Health	+++	+	---	+	---		+	---	+	+	---		+
	Combined	+++	++	---	++	---	+	++	---	+	++	---	-	+
Agro-pastoral enterprise	Genetics	++	+++	++	++	++		++	++		+++	+	-	++
	Feed	++	+++	++	+++	++	+	+++	++		+++	--	---	+
	Health	++	+++	++	+++	++	+	+++	++		+++	--	---	+
	Combined	+++	+++	-	++	-	+	+++	-	-	+++	--	-	++
Tanga VC	Genetics	+	++	+	+		-	+		-	+		-	+
	Feed	++	+++	+	++	+		++	+	-	++	--	---	+
	Health	++	++	+	++	+		++		-	++	--	--	
	Combined	+++	+++	-	++	-	+	++	-	+	++	--	-	+

- **Productivity increases** go hand-in-hand with increased resource-use and GHG emission **efficiency**.
- **Absolute increases in natural resource use** point to the need for effective management of stocks and quality of these resources (e.g. appropriate manure management to prevent nutrient mining).
- An overall **rise in GHG emissions** is expected.

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