Land requirement to feed a productive dairy cow and a healthy family

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Send a Cow + CIAT learning workshop on most effective land use options for smallholder dairy farmers

Overview

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-Background SAC-CIAT collaboration

-Objectives

2) Methodology

-Selection of sites and case study farms

-Data collection

-Data analysis and modeling

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-Farm overview

-Feed gap analysis

-Milk and total land

-Land for 1 dairy cow

-Profitability

-Labour and economics

-Environment

4) Scenarios

-Overview

-Feed gap analysis

-Land for 1 dairy cow

-Profitability

-Economics

-Environment

5) Farmers feedback

-Positive and negative aspects

-Challenges

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1) Introduction

- SAC
- SAC - Kenya since 1996
- Empower smallholder farmers through trainings in sustainable agriculture and through gifting livestock and planting material.
- Western Kenya, resource poor farmers, average farm size 1.5 acre

"How much land is needed to feed a productive dairy cow and a healthy family?"

- CIAT- SAC collaboration

- CIAT forage team has expertise in farming systems research and trade-off analysis for fodder production.

Objectives:

- Assess the land requirement for a dairy cow across most relevant farming systems.
- Propose best-bet feeding options.
- Explore trade-offs of these feeding strategies with food vs. feed land requirements, environment, labour and gender equity, and profitability.

Research questions:

- How much land is needed to feed a cow and a family with various best-bet feeding strategies across most relevant farming systems?
- What are the synergies/trade-offs of these feeding strategies with environmental quality (soils and GHG), gender equity, profitability and labor requirements?

2) Methodology - data collection

- Selection of sites and case study farms

-Western Kenya: Kakamega, Bungoma, Busia and Siaya

-Selection criteria: administrative boundary, market access, one lactating dairy cow, representativeness

-8 representative case study farms (4 counties * remote/accessible)

- On-farm data collection:

-Empirical data collection

-Geographical location (GPS)

-Farmer interview

- Focus group discussions

2) Methodology – data analysis and modelling

- Modelling tool: “CLEANED” calculator

-inputs: agro-ecology, livestock, feed basket

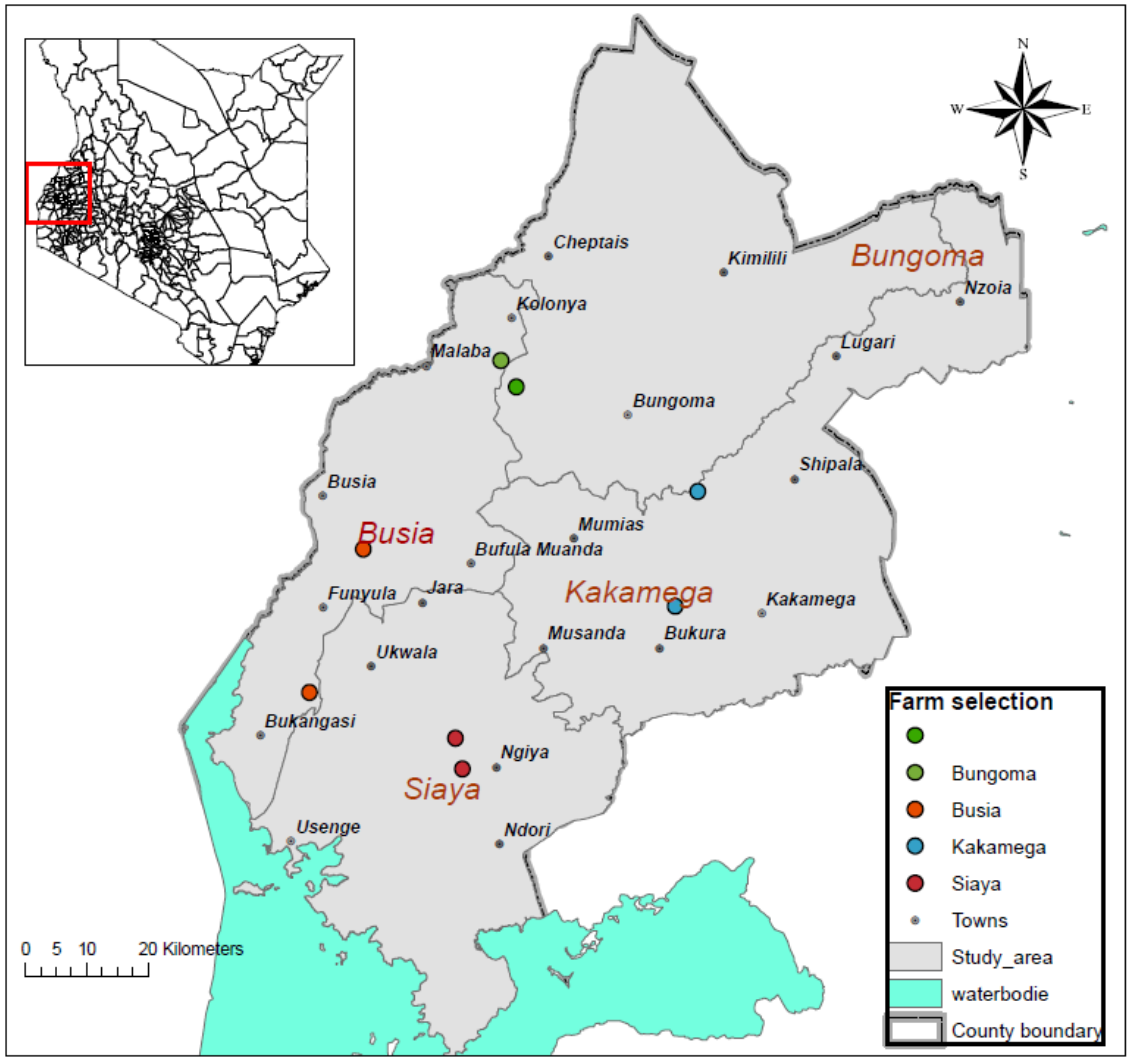
-outputs: land requirement, environmental indicators, value of production

- Excel calculations for Feed Gap Assessment

- ArcMAP for farm mapping

Farm overview

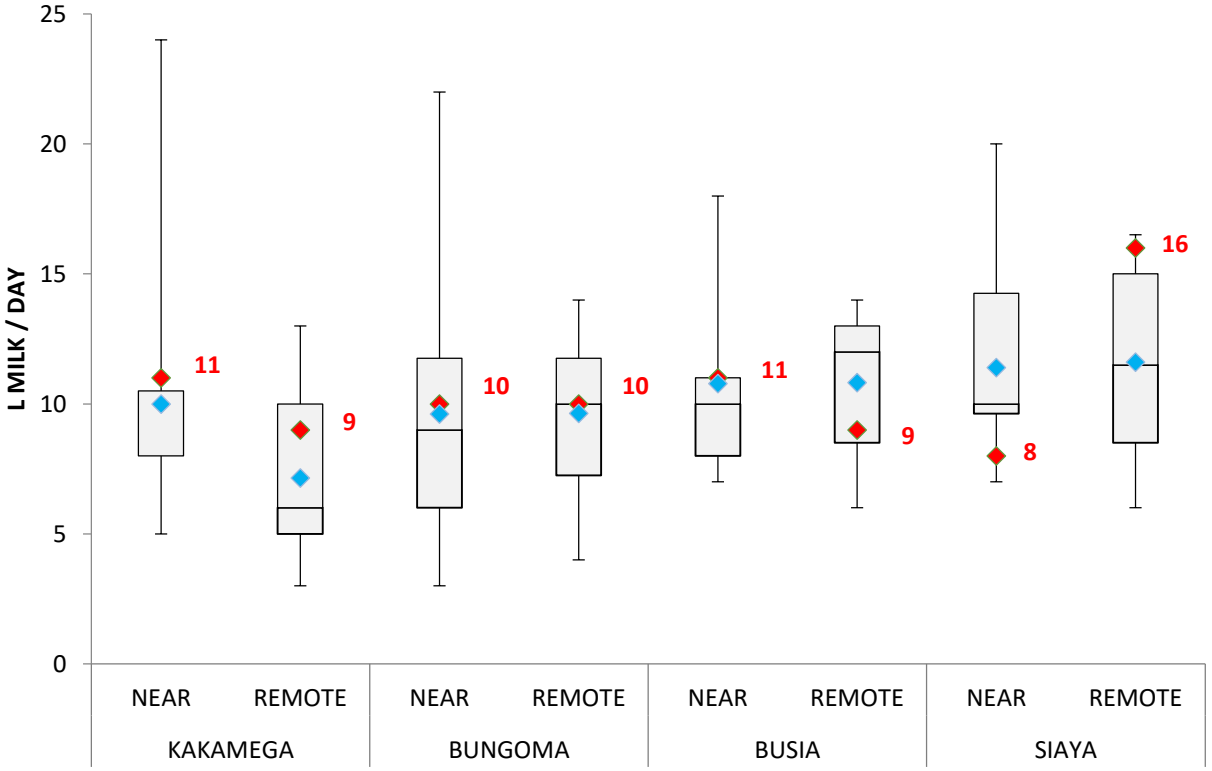
FARM ID	COUNTY	LOCATION MARKET ACESS	PRECIPITATION (mm/yr)	SOIL FERTILITY	HH MEMBER (ADULTS+ CHILDREN)
1KN	KAKAMEGA	NEAR	++ (1924)	high	7+7
2KR	KAKAMEGA	REMOTE (14 KM)	++ (1895)	high	2+5
3BN	BUNGOMA	NEAR	+ (1725)	medium	2+5
4BR	BUNGOMA	REMOTE (7,5 KM)	- (1726)	low	4+6
5BN	BUSIA	NEAR	+ (1717)	medium	5+5
6BR	BUSIA	REMOTE (4,5 KM)	- - (1430)	low	2+4
7SN	SIAYA	NEAR	- - (1460)	HIGH	3+4
8SR	SIAYA	REMOTE (2,5 KM)	- (1530)	high	4+2

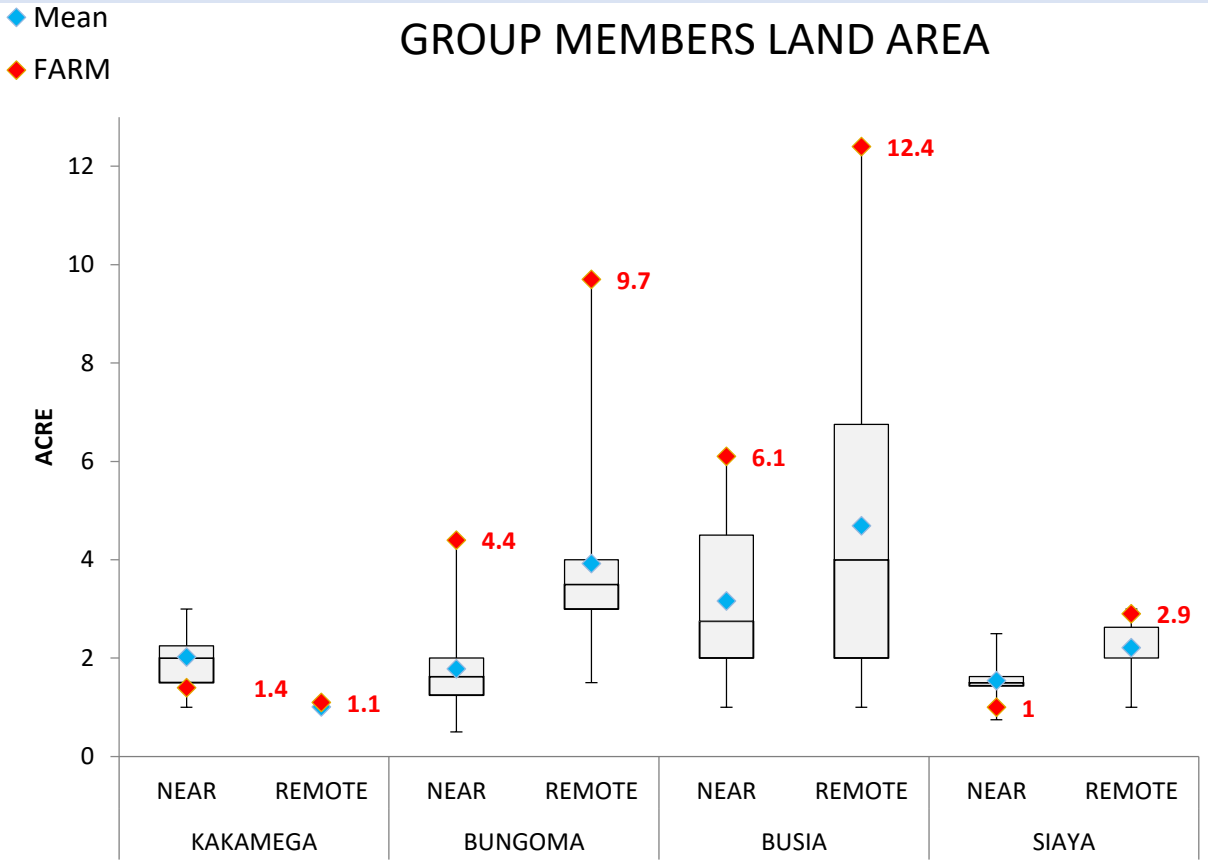


Our vision, a sustainable food future

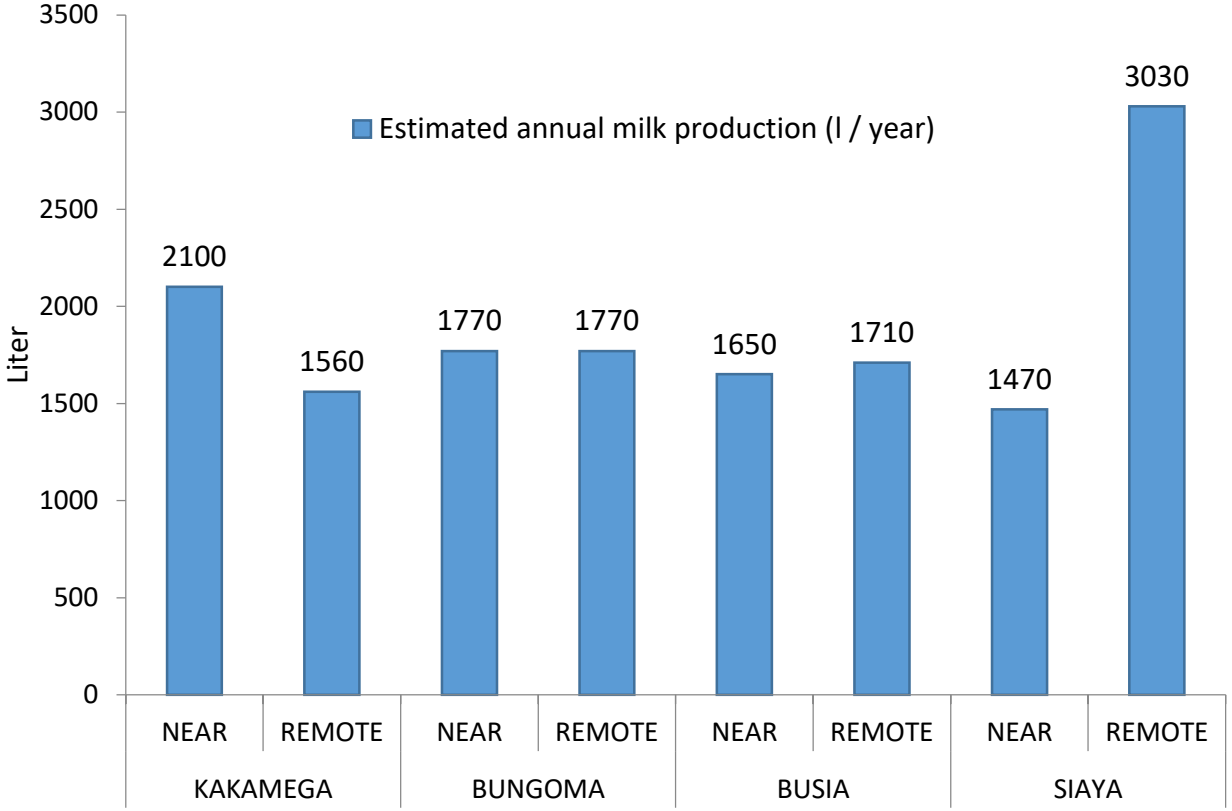
CIAT 50 1967-2017

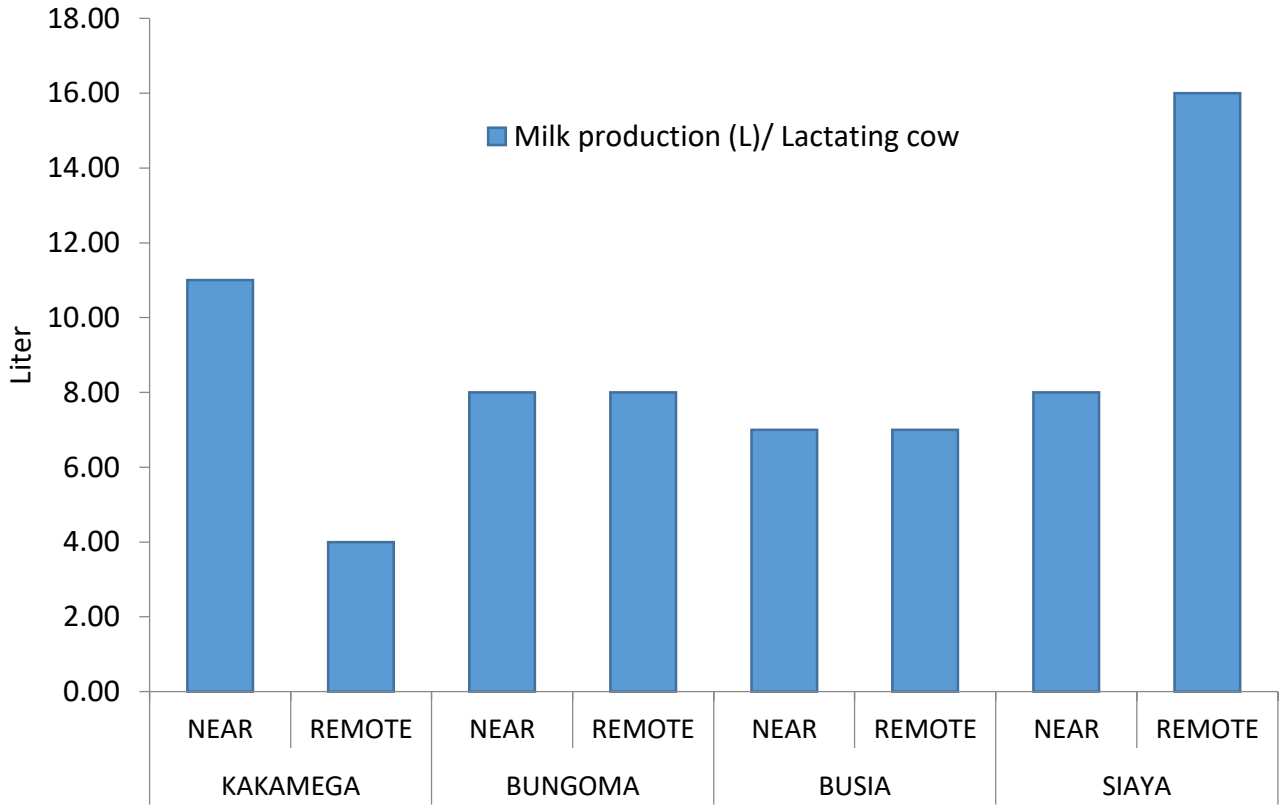
3) Baseline results



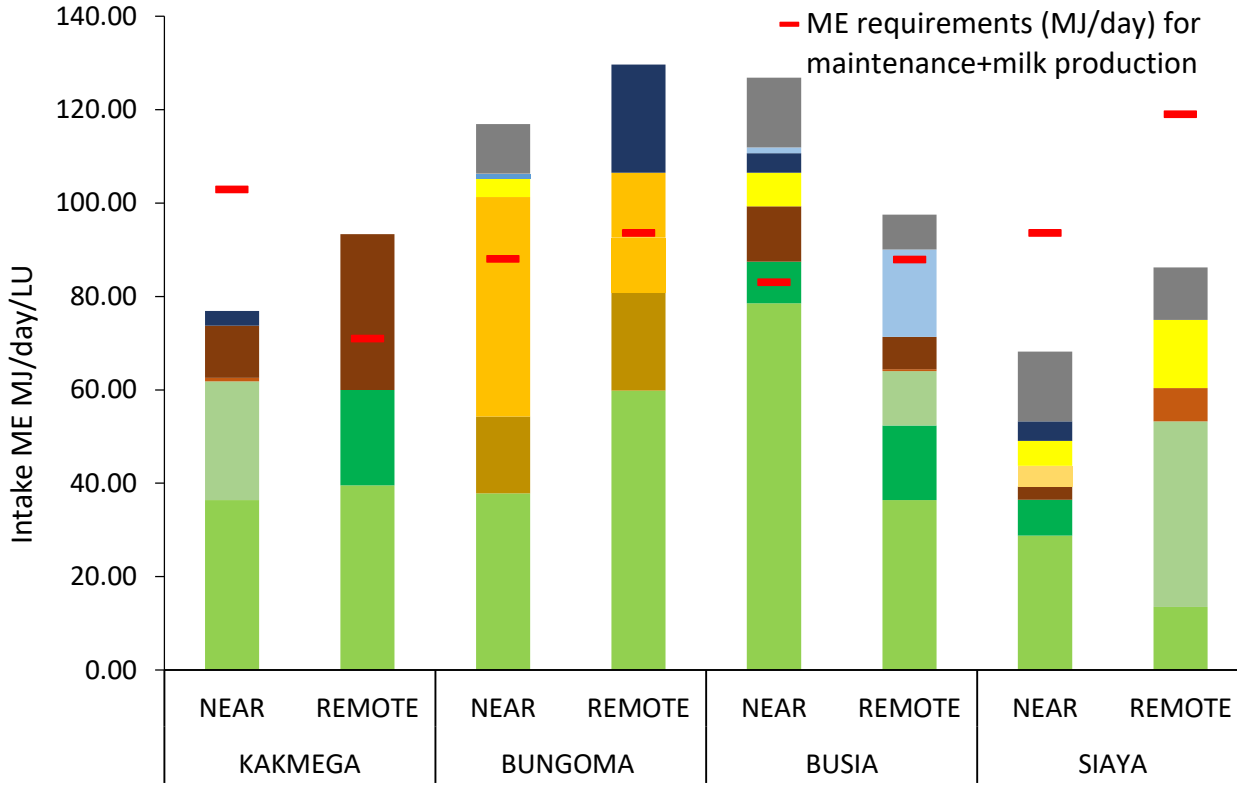


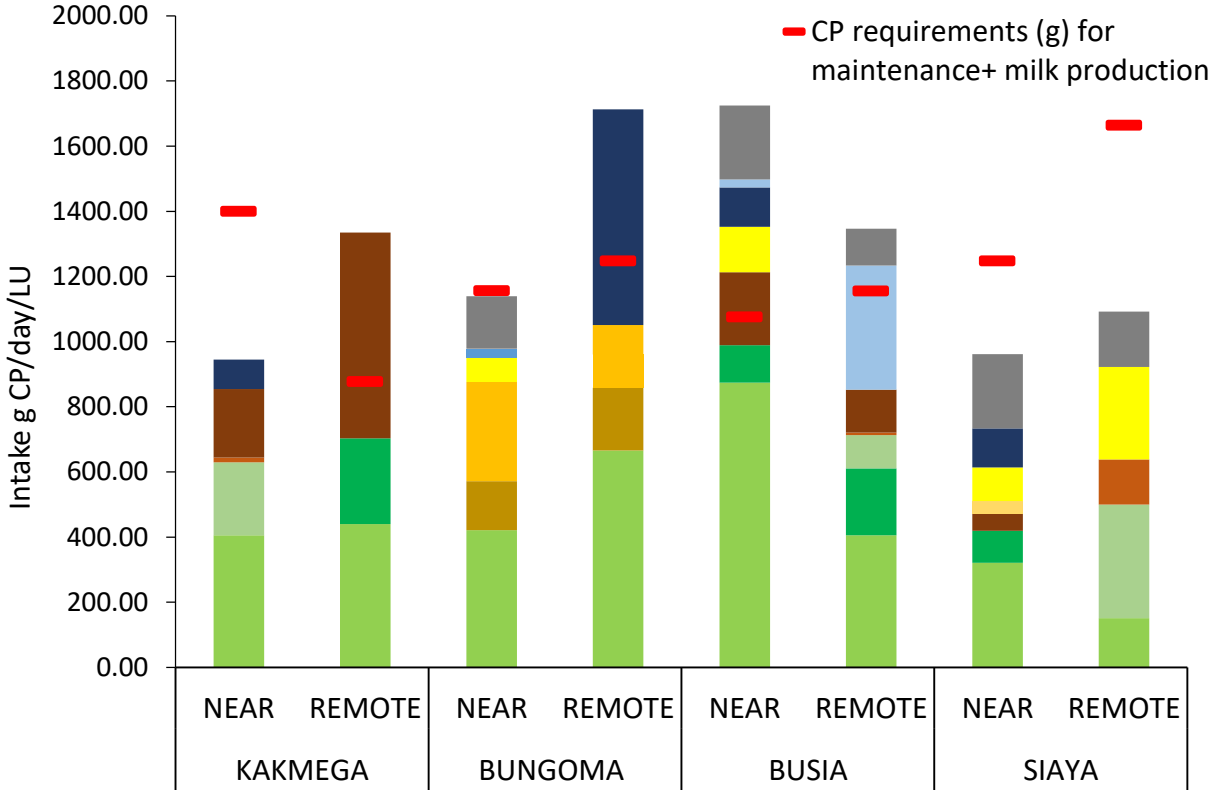
Milk production





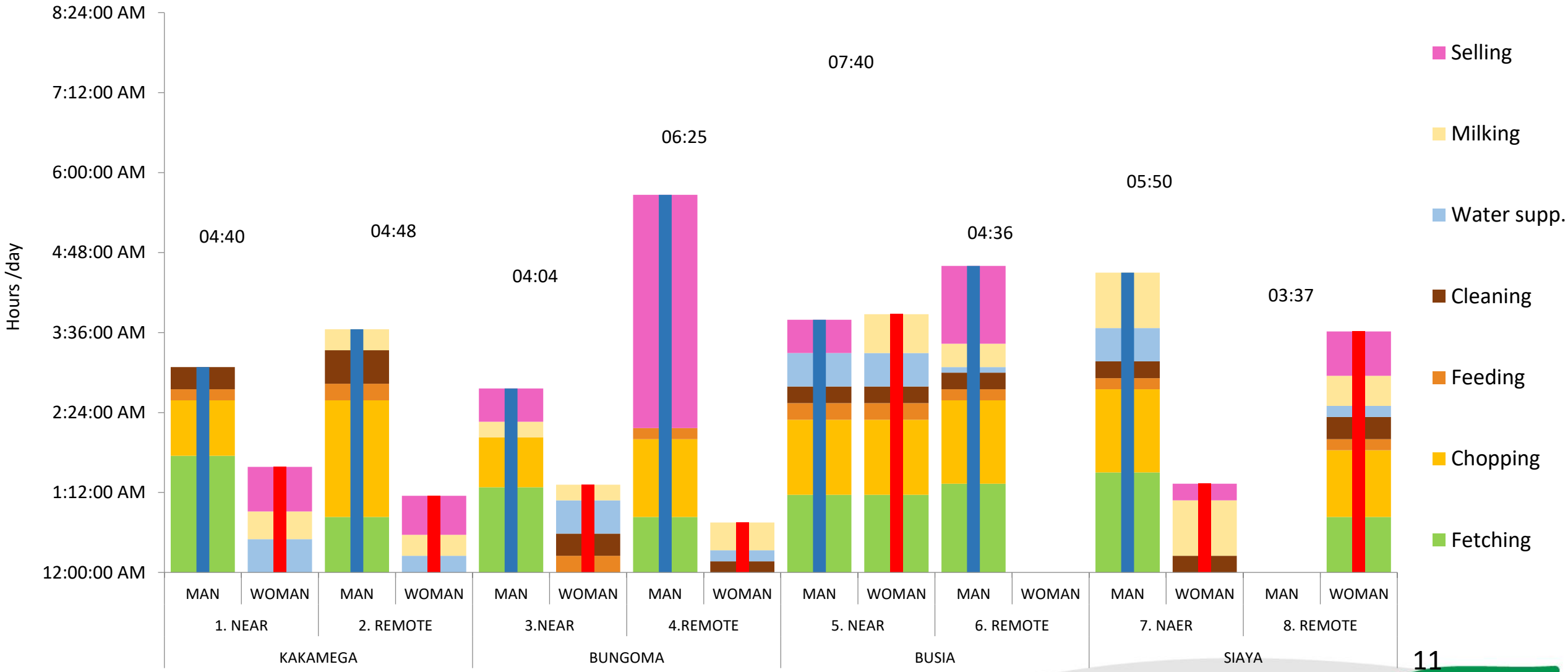
Energy and protein balances



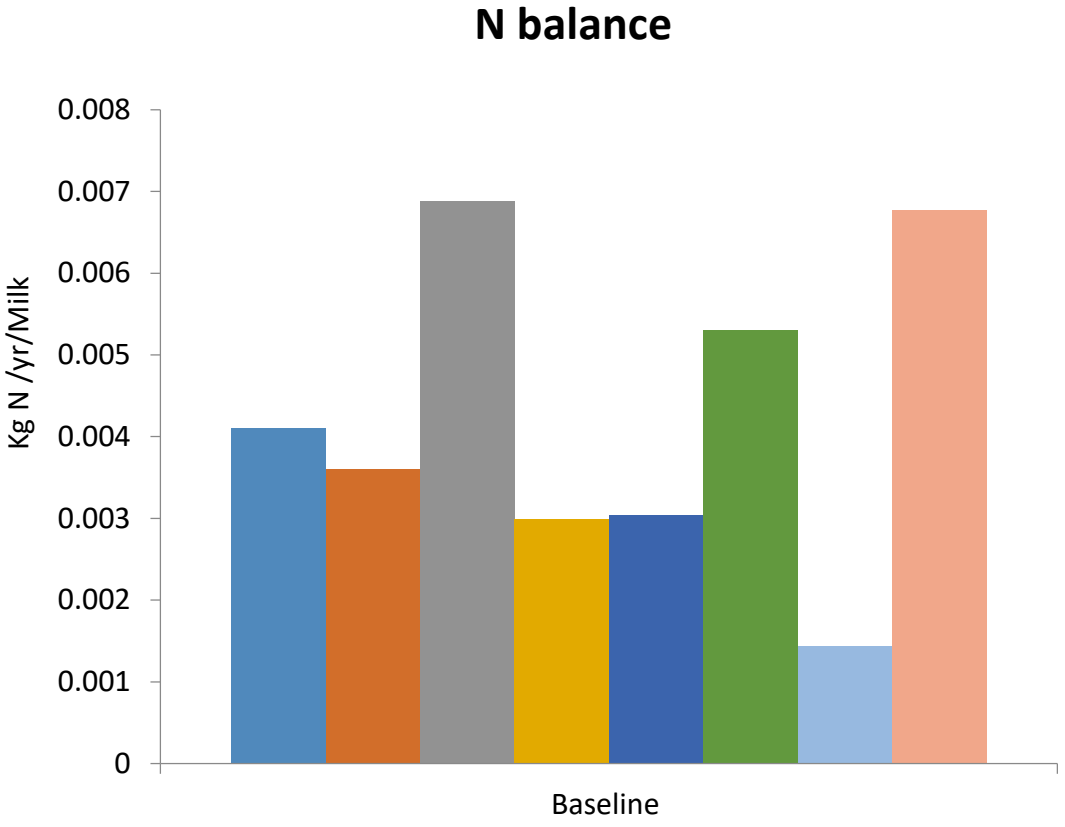


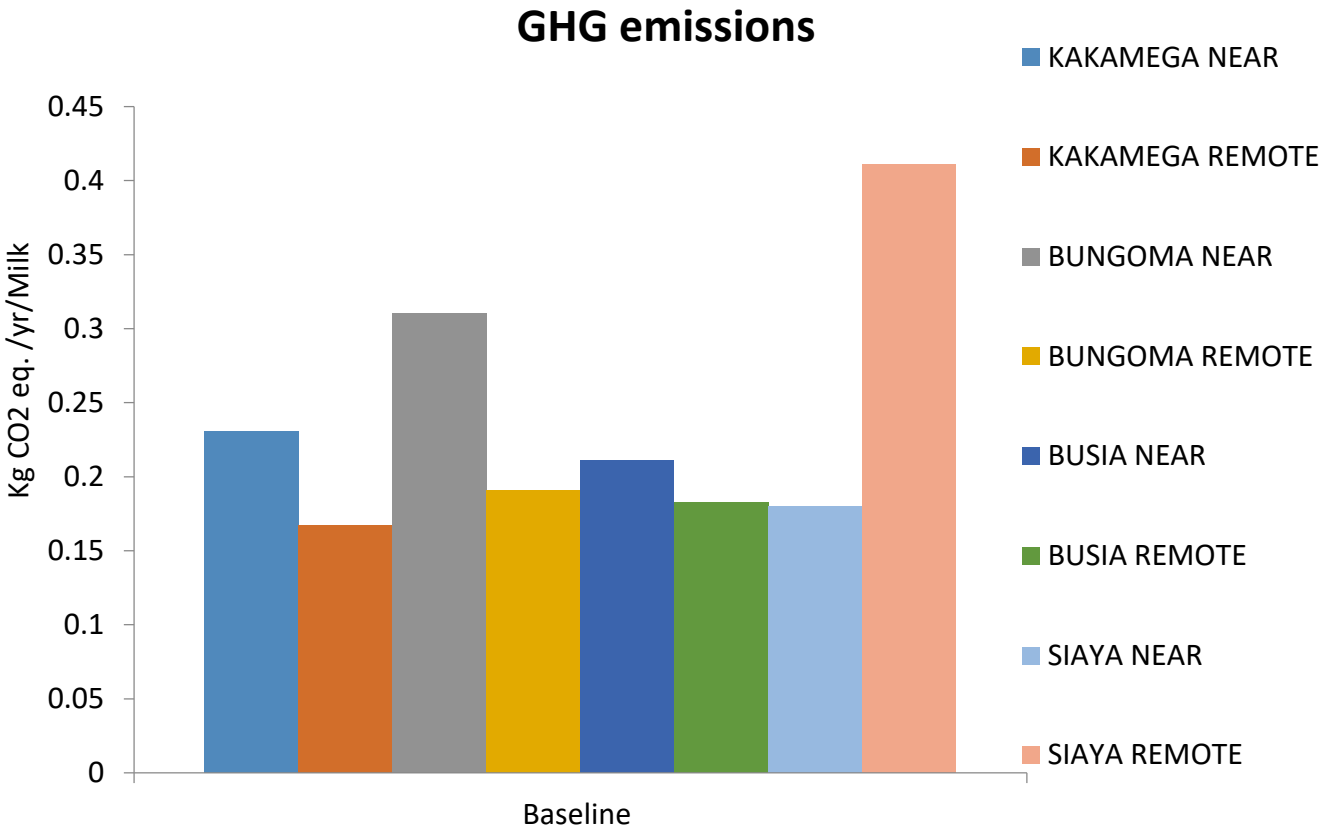
- Dairy meal
- Sesbania
- Leucaena
- Calliandra
- Sweet potato - vines
- Sugarcane - tops (green fodder)
- Maize - stover
- Maize - green fodder
- Common Beans- vines
- Desmodium
- Wild Desmodium
- Local mixed grasses
- Brachiaria
- Napier

Labor and gender implications



Enviromental impact

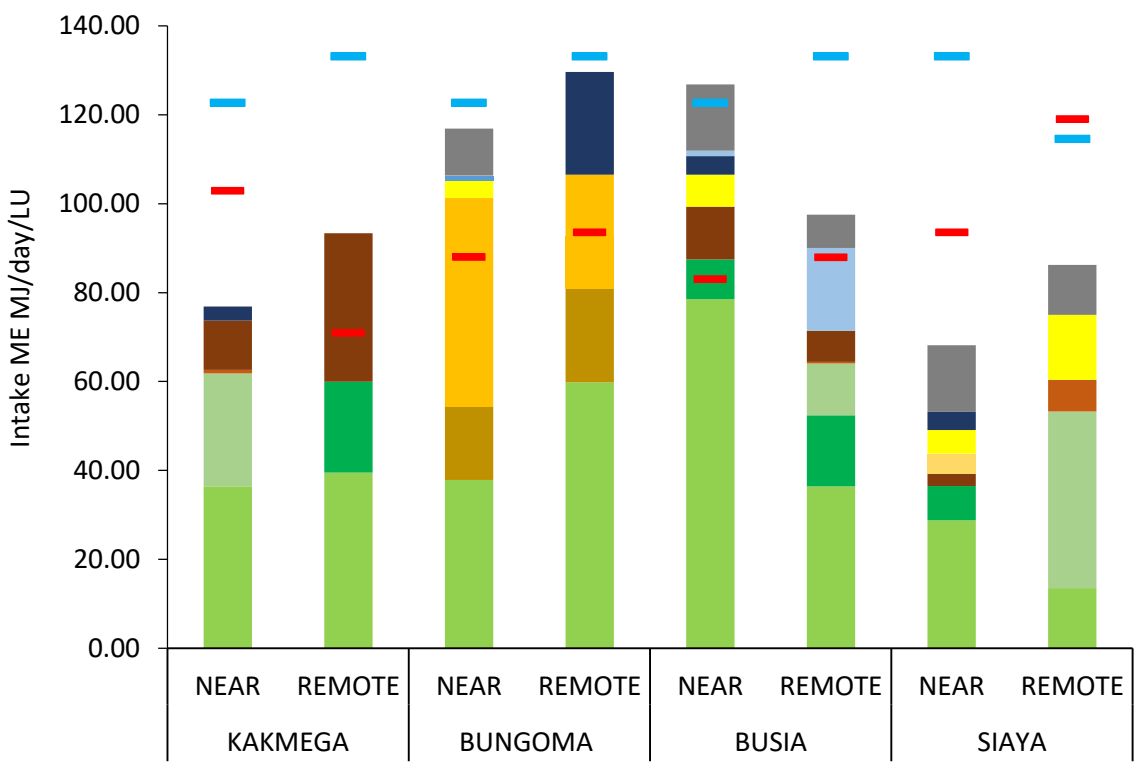


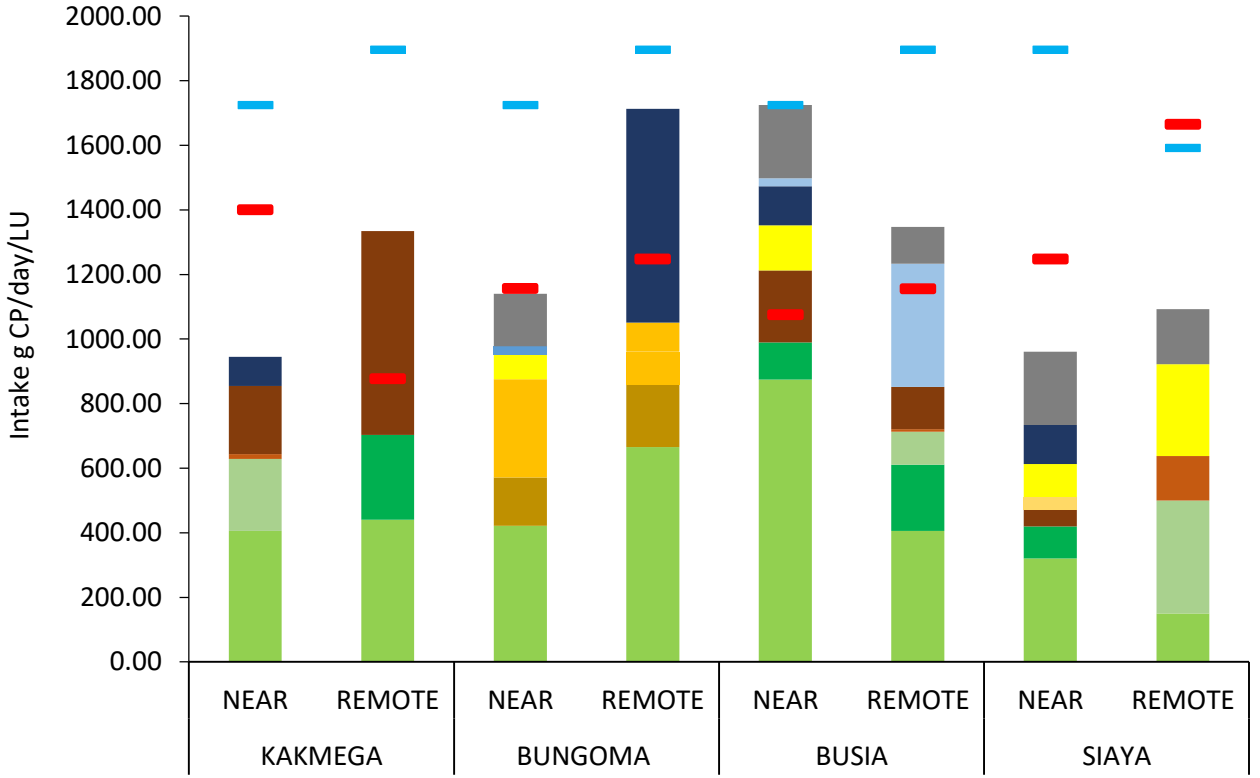


4) Scenarios

SCENARIO	MILK REGIME	EXPLANATION
Milk	- HIGH	ANNUAL MILK INCREASE TO 3000 L (15 L/DAY)
Bracharia	CURRENT HIGH	ALL NAPIER TRANSFORMED INTO BRACHARIA
2:1 Ratio	CURRENT HIGH	65 % GRASSES 35 % LEGUMES
Dairy meal	CURRENT HIGH	5 %
Calliandra	CURRENT HIGH	15 %

Feed Gap at 3000 L/yr





Dairy meal
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Sweet potato - vines
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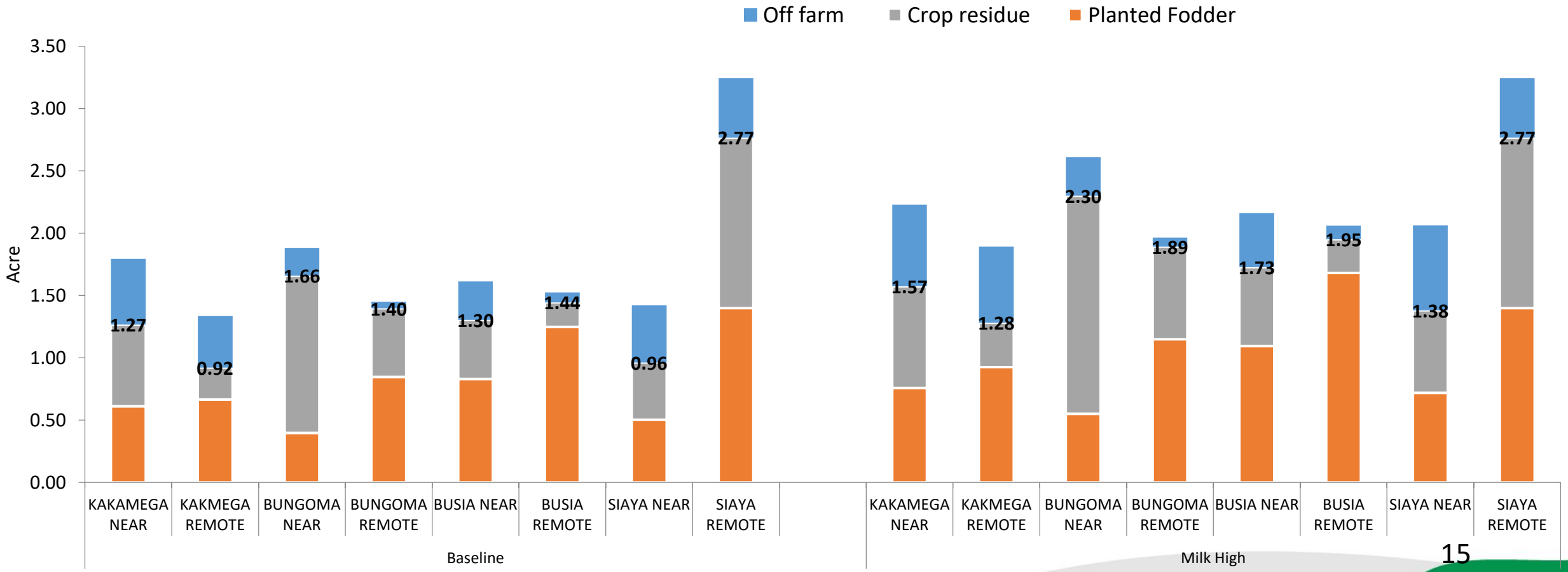
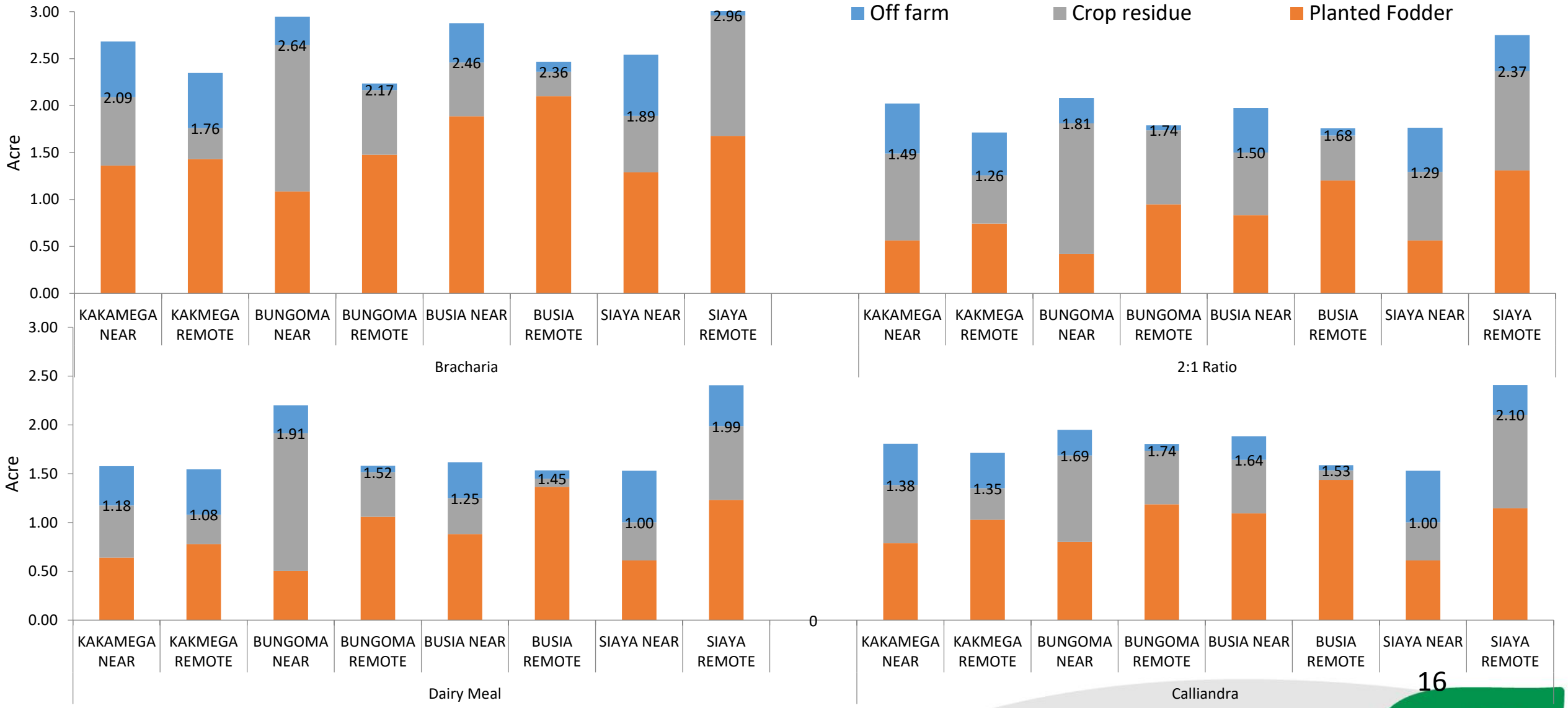
Desmodium
Wild Desmodium
Local mixed grasses
Brachiaria
Napier

Area equivalent

MILK incr. %	30	48	41	41	45	43	51	0		
LAND incr %	24	42	39	35	34	35	45	0		



Area equivalent



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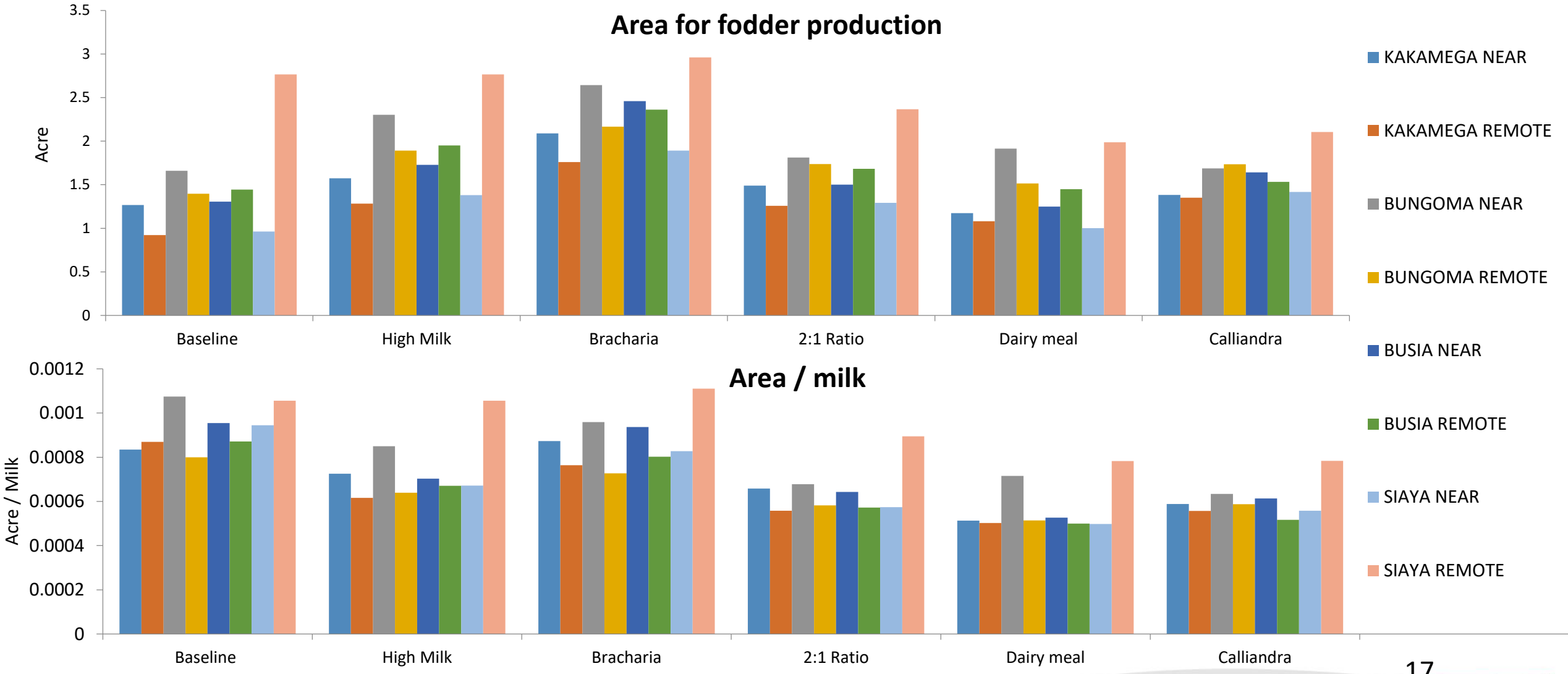
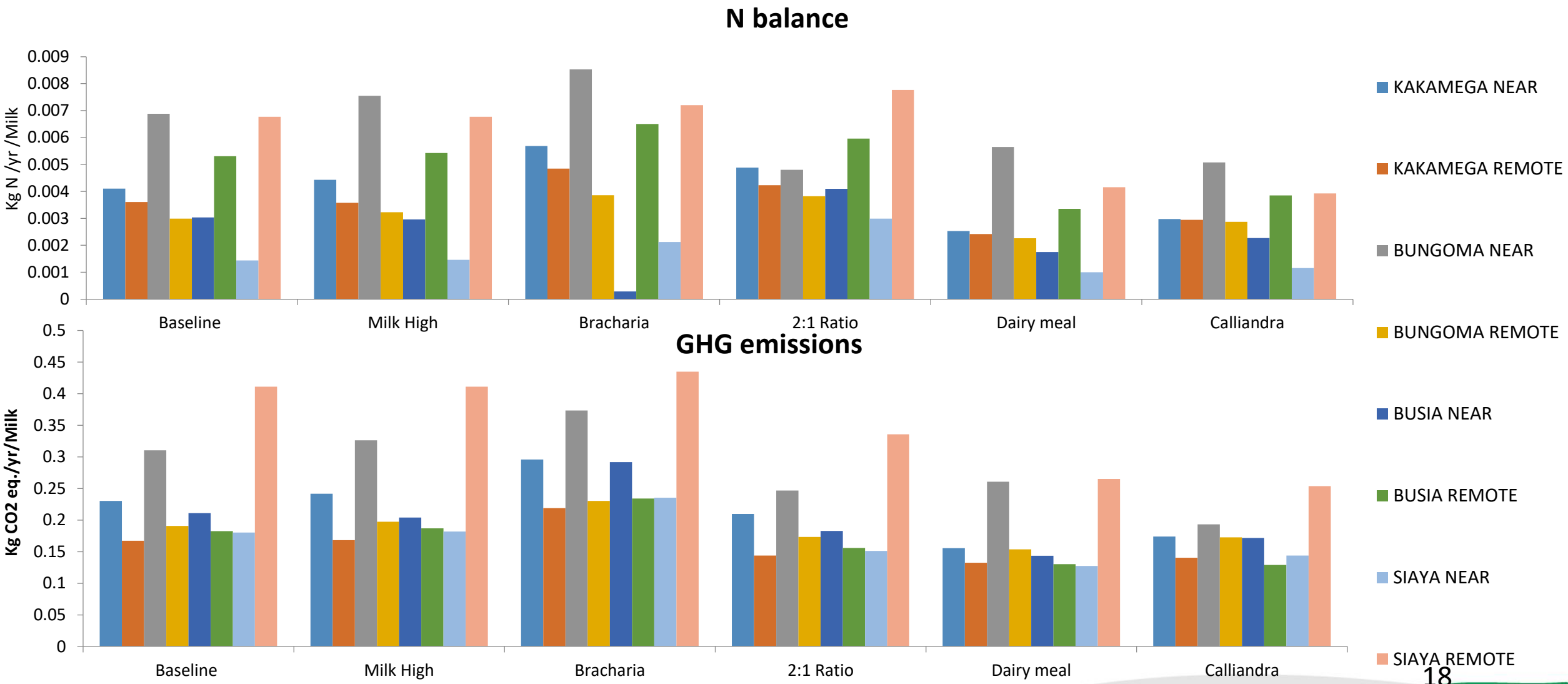
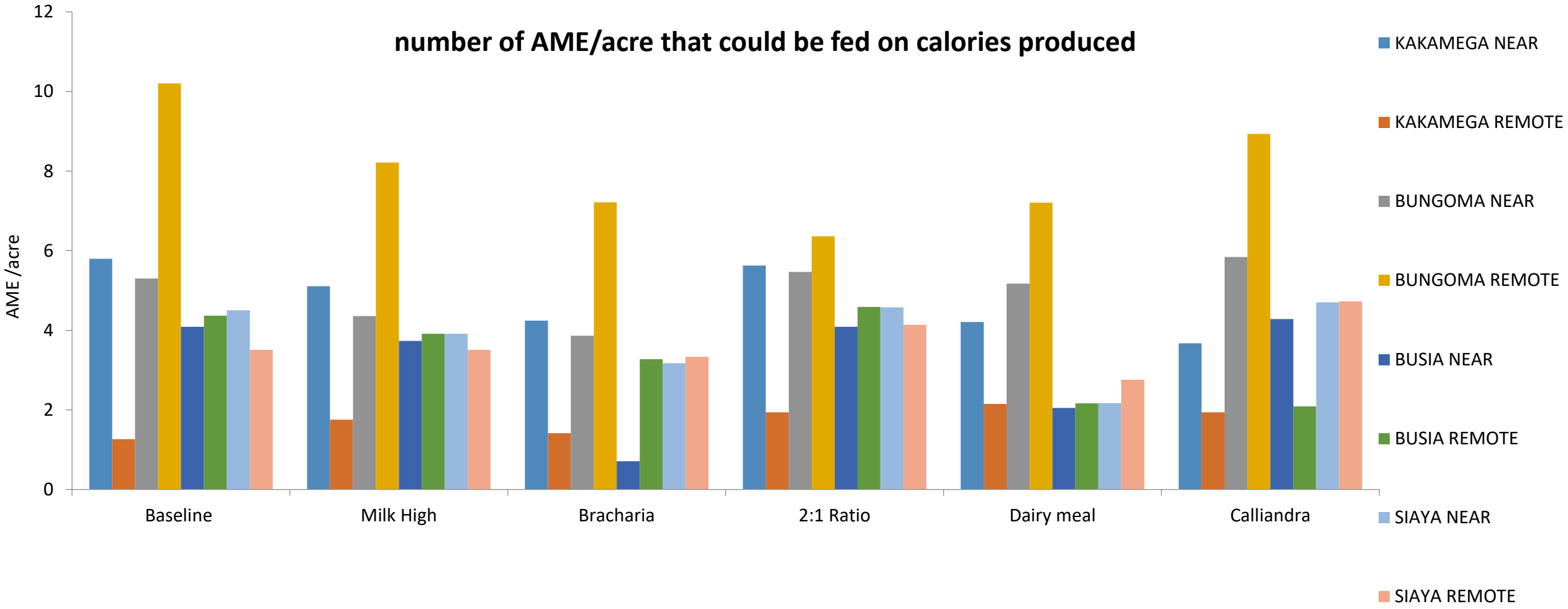
Area per dairy cow and per produced milk



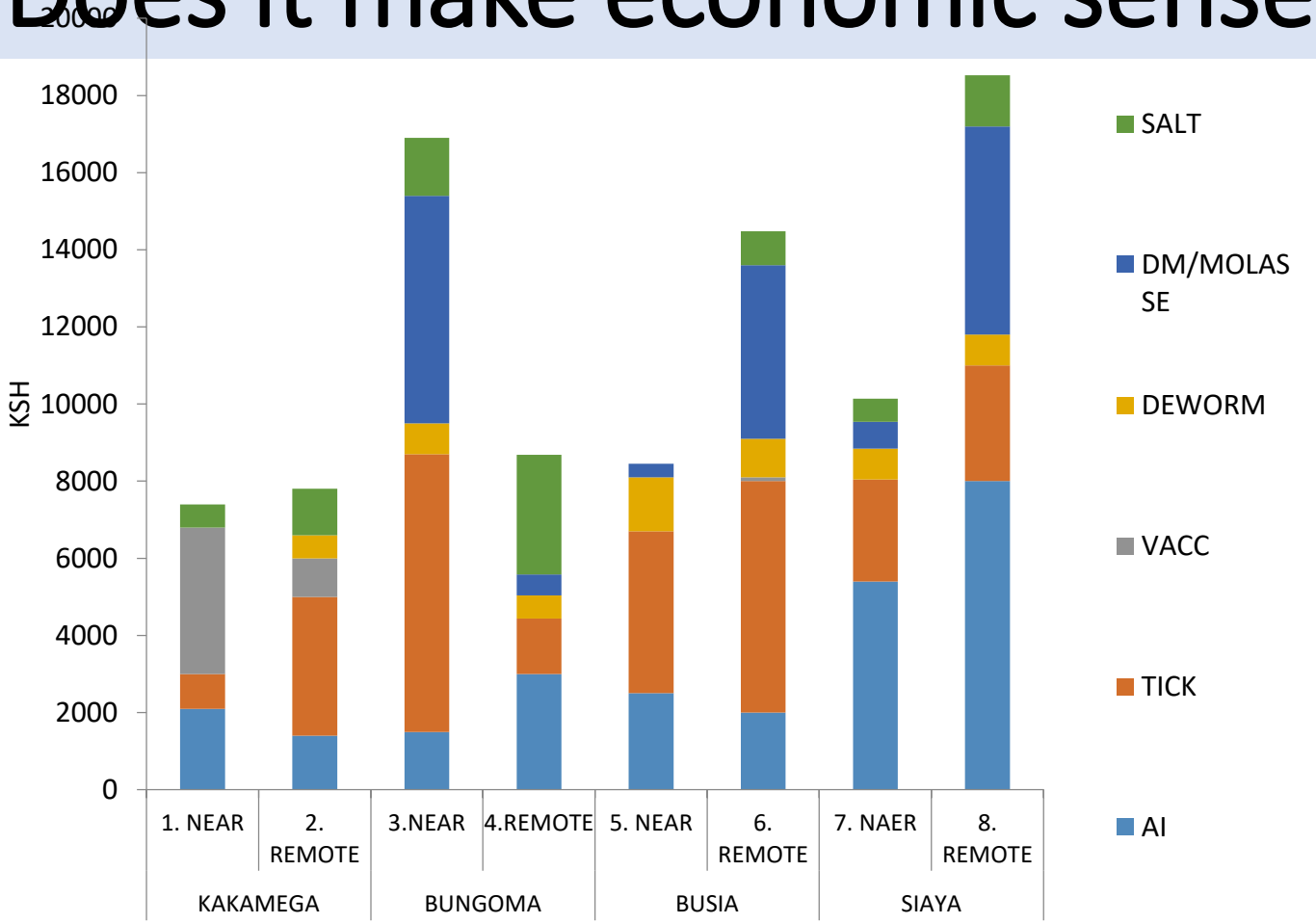
N Balance and GHG emissions

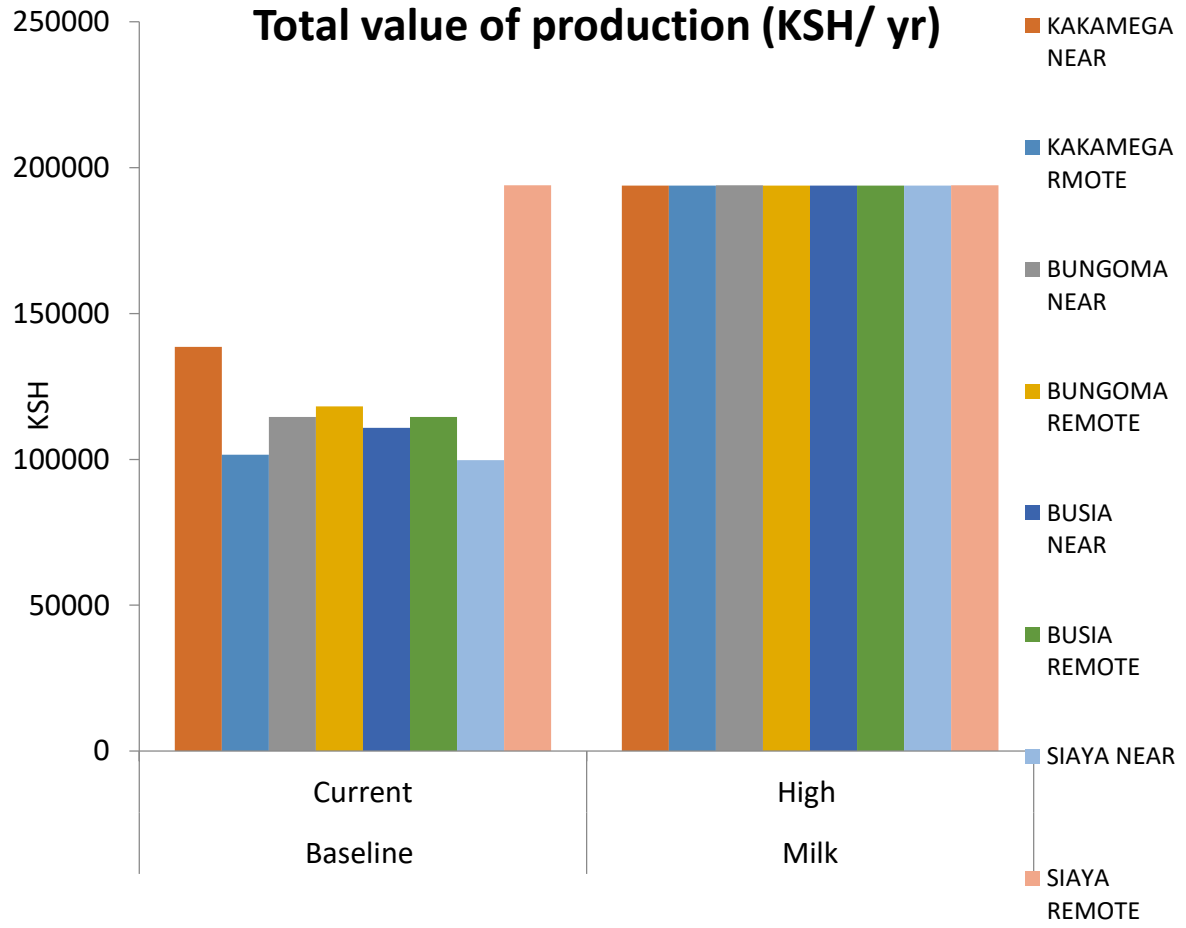


Livestock's contribution to food security (energy)



Does it make economic sense?





Example for Kakamega Near

Payback Period :
Number of years necessary to pay back the initial investment

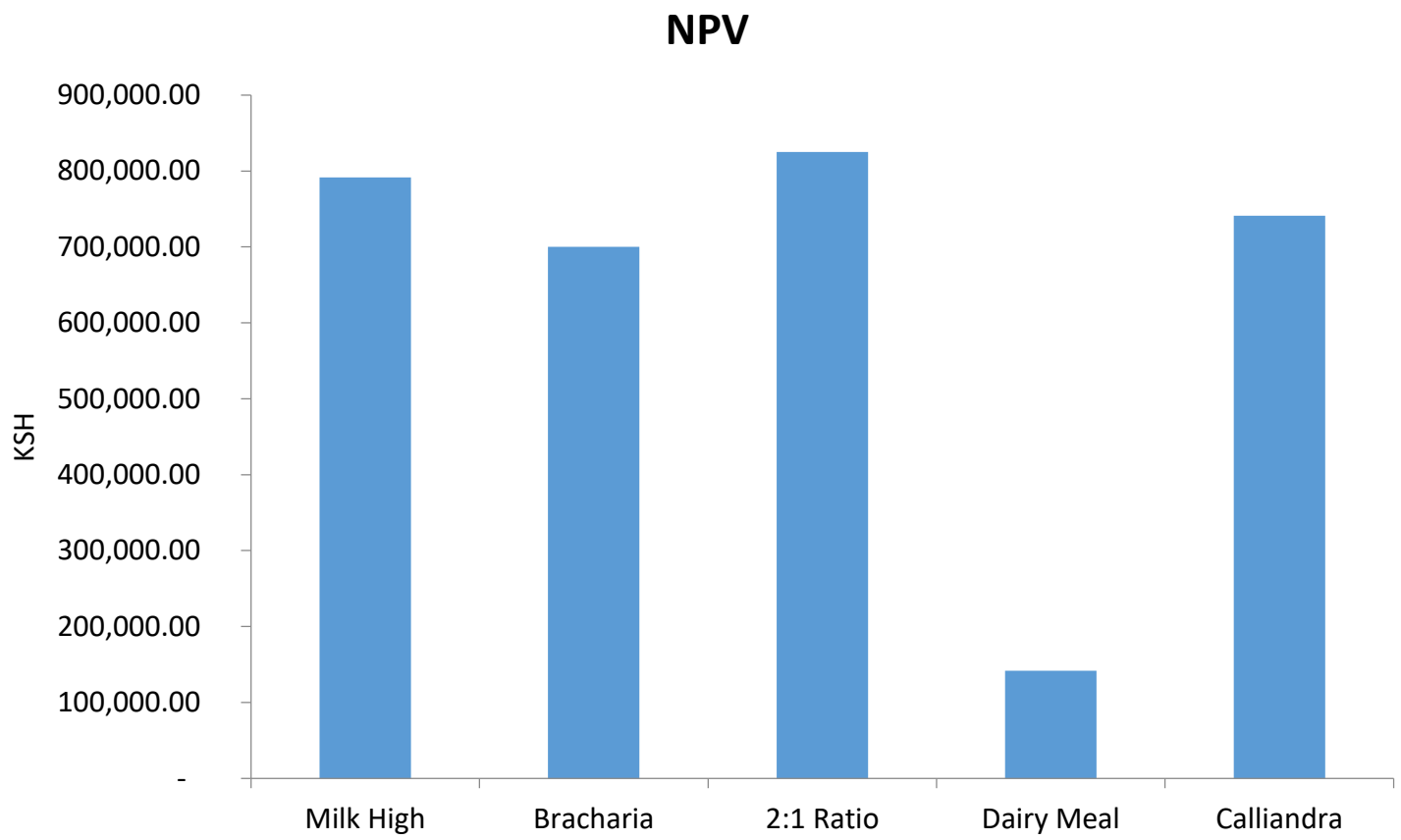
Milk High: Establishment year

Bracharia: Establishment year

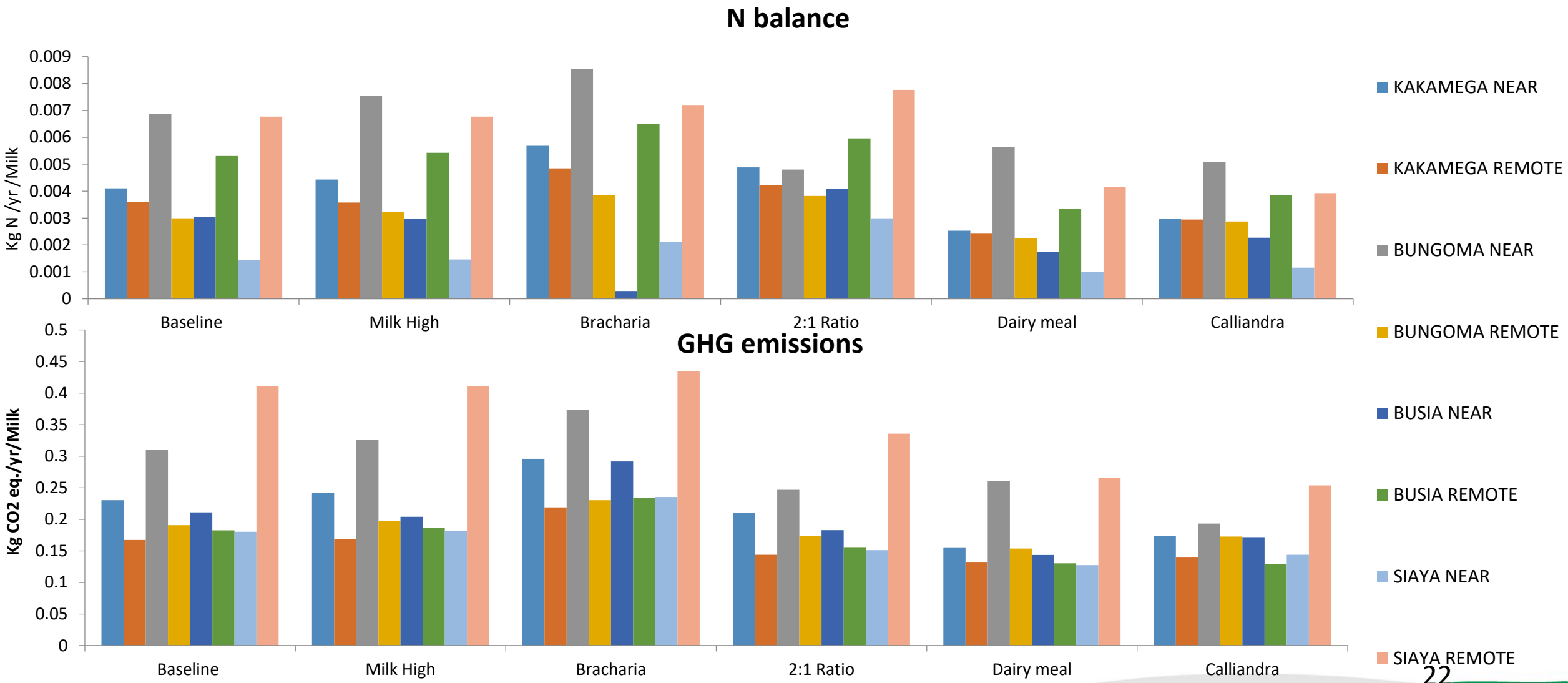
2:1 Ratio: Establishment year

Dairy Meal: 2nd year

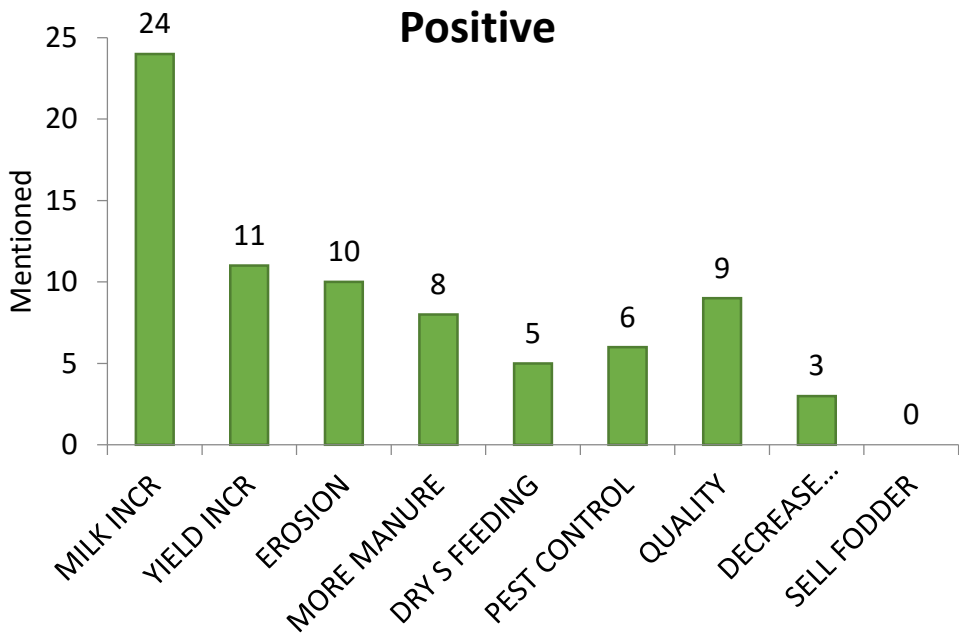
Calliandra: Establishment year

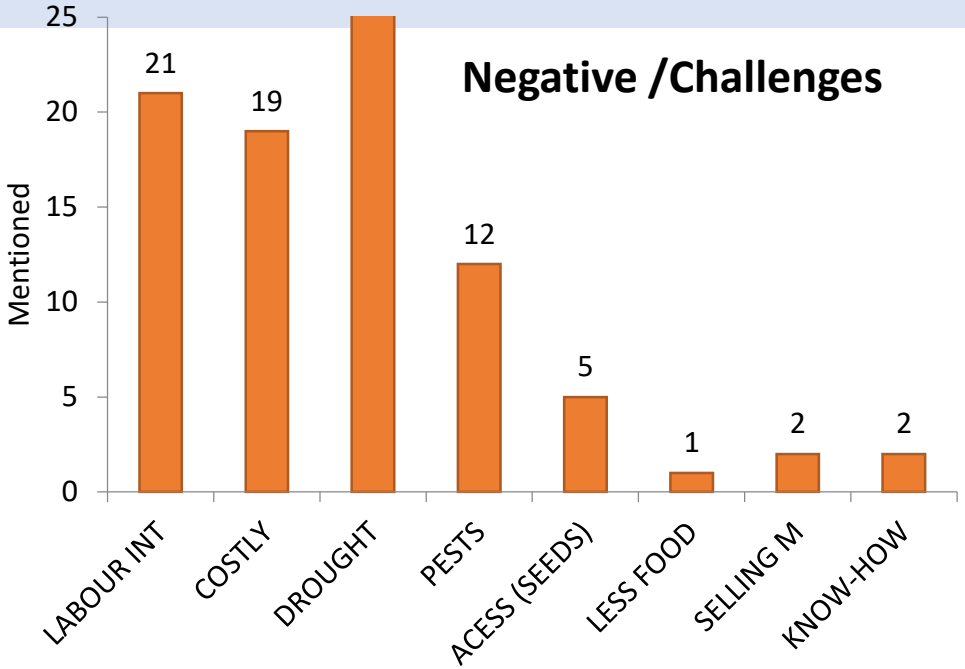


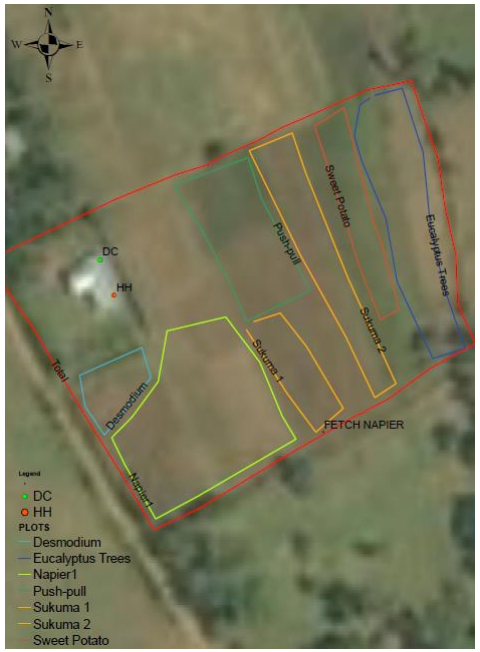
Environmental sustainability

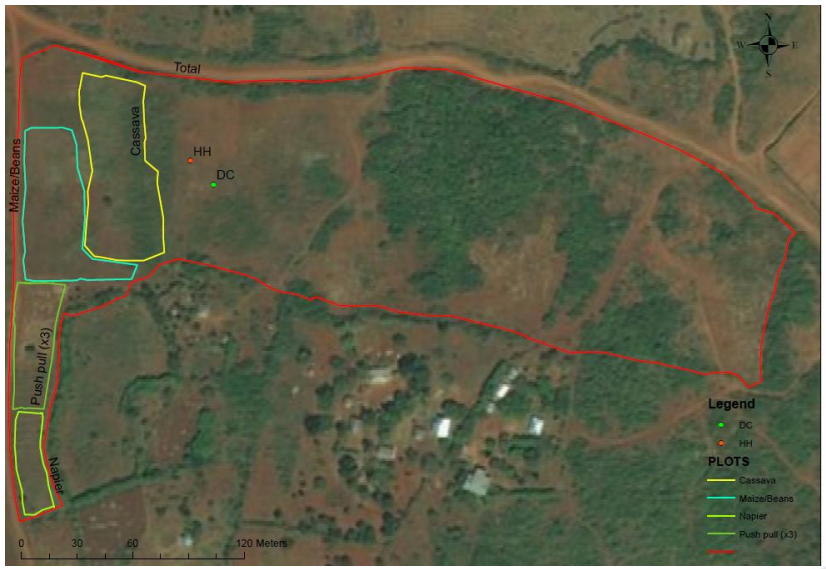


FGD: farmers' opinions









1) Cost of establishment?
2) Positive/negative anspects, challenges?
3) Is it realistic? Would you do it? Why?
4) How much land for food and for fodder?

Conclusion and outlook

- Potential for 3000 L /year
- Economically feasible
- Labour intensive, labour force is limiting
- Development of CLEANED tool