



# Sweetpotato for livestock feed

1<sup>st</sup> Sweetpotato Stakeholder Forum, Namulonge Uganda, 1st July 2010

Ben Lukuyu, ILRI Nairobi



East Africa Dairy Development

In partnership with



**SASHA**

**Proof of Concept**

**Project**

# Introduction

# Why sweetpotato is suitable as livestock feed?

- Can easily be incorporated in smallholder farming systems – abundant suitable niches
- Vines and small roots and tubers unsuitable for human consumption are rich in protein
- Can be utilized with locally available feeds such as poor roughages to improve quality

# Nutrients of some feed resources compared to sweet potato vines

Feed types	DM fraction	ME (Mj/ kg DM)	Crude Protein (g/ kg DM)	Harvest Index
Napier grass	0.17	8.2	128	0.9
Maize-beans mixture	0.61	7.4	133	0.44
DP sweetpotato vines	0.33	9.0	234	0.27

**Source: Claessens et al., 2009**

# Comparison between yields and DM of Napier grass and sweetpotato vines

Parameter	Napier grass		Sweetpotato vines		
	Flat land	Rock soils	Uganda	Kenya	Rwanda
Fresh yield (tons/ha/year)	35	17.5	70	90	70
DM content (%)	14	15	13	13	13
DM yield (tons/ha/year)	4.9	2.6	9.1	11.7	9.1
Protein (tons/ha/year)	0.44	0.26	1.82	2.34	1.82

**Source: Dai Peters, (2008)**

# Effects of various types of feed on milk production

Basal diet (60 kgs/day)	Supplement	Rate kg/cow/day	Milk production (litres/day)
Napier grass	Project dairy meal	2	6.83
Napier grass	Home made meal	2	6.77
Napier grass	Sweet potato vines	10	6.42
Napier grass	Farmers' dairy meal	2	6.42
	LSD (P-0.05)		0.586

***Kariuki et al, (1999)***



# **Activities** **(experiments)**



# SASHA Sweetpotato as livestock feed activities

- Activity 1 Screening sweet potato germplasm for biomass production under different cropping regimes and their potential as dual-purpose varieties (One Msc. student each in Kenya and Rwanda)
- Activity\_ 2. Adapting simple, low-cost, silage-making techniques using sweet potato roots and vines, other feed resources and legumes. (One Msc. student based in Kenya)
- Activity 3. Modeling and testing novel feed production and feeding strategies based on optimizing sweet potato-legumes-other feed resources-pig and dairy interactions. (One Msc. student based in Kenya)

In Rwanda and Kenya

# Activity 1: Why screen for dual purpose varieties?

- Sweetpotato production
  - Varieties selected for human consumption, thus low-yielding, and wasteful as animal feed
  - Method of cutting vines does not yield the highest productivity potential

# Activity 1: The experimental design

- Comprise 6 sites x 6 varieties x 2 harvesting times.
- Each plot is planted with one variety with 6 rows of 1m apart each with 20 plants spaced 30 cm apart (a plot is approx. 6x6 m).
- Harvesting regimes are at 75days (only forage leaving stubble length of 30 cm) and 150 days (whole plant for those harvested at 75ds and those not harvested at 75ds).

# Activity 1: Data being collected

- Climatic data (rainfall and temperature)
- Soils before and after the experiments (N, P and K nutrients)
- Total yield (forage and root)
- Leaf: stem ratio
- Nutritive value (proximate analysis)
- Participatory farmer and cow preferences will be conducted with farmers 75 and 150 days

# Activity 2: Objectives

- Test silage quality of different sweetpotato harvested at different harvesting stages in combination with different locally available feed resources

# Activity 2: Silage trial

- All six varieties grown on station at University of Nairobi Kabete.
- Prepare silage at 75 days (already made) and 150 days using silage tube
- Silage prepared fresh with and without additives
- Silage prepared after wilting fresh with and without additives
- Will be opened at different times: 10, 20, 30, 90 days
- Additives includes molasses and maize bran


# Activity 2: Parameters to be measured

- DM and nutritive value of pre-ensiled material
- Ensiled material:
  - DM content
  - Protein
  - pH
  - Ammonia N
  - Fibre content
  - In vitro DMD
  - In vitro gas.
  - NIRS (energy, amino acids, minerals)

# Activity 3: On farm feeding trials

- Use results of experiment 1&2 to develop optimum feeding strategies using LIFE-SIM and test on farm with pigs (Planned from year 2)



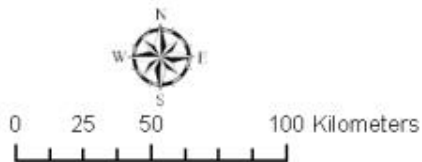
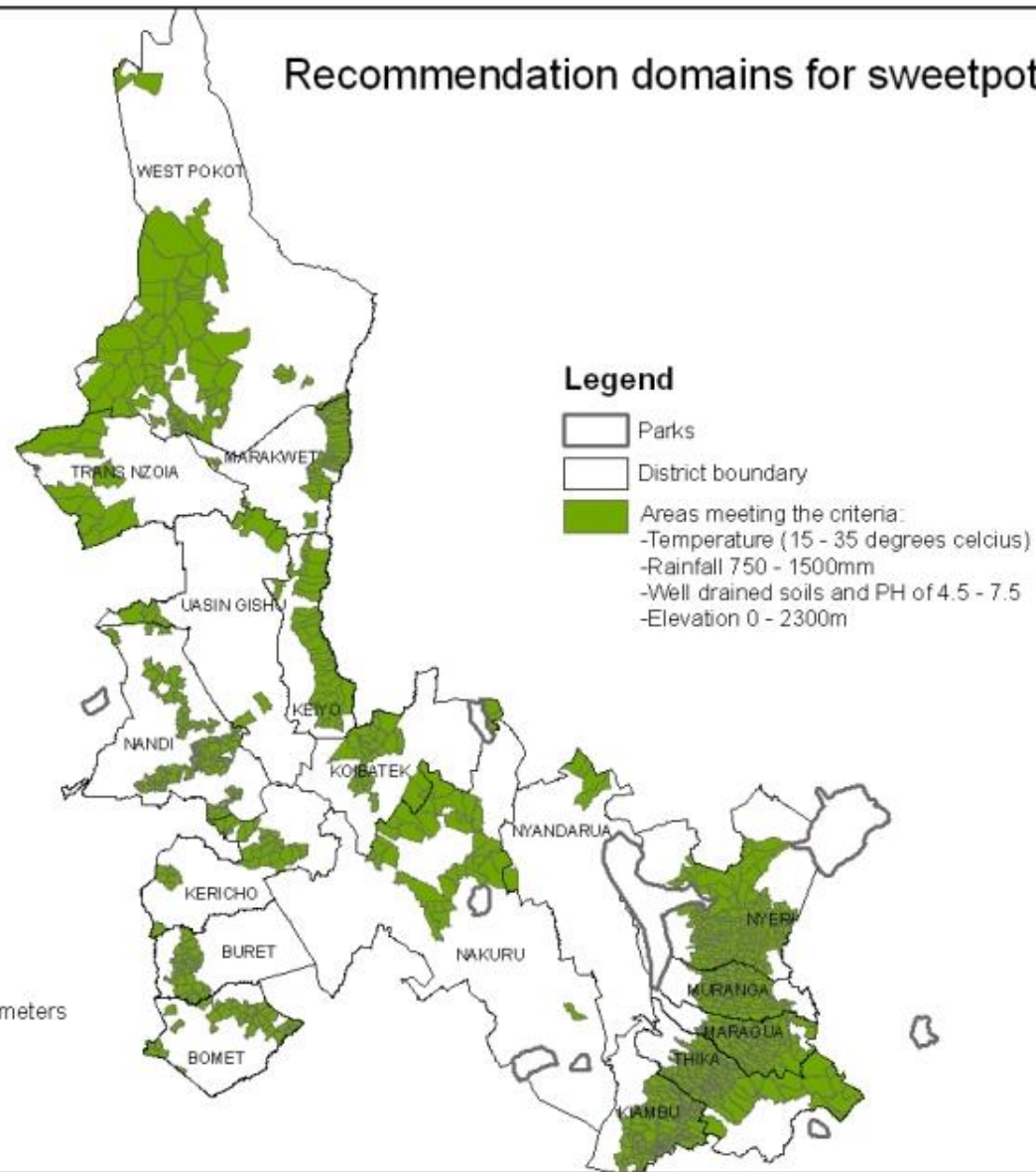


# Study sites & selected varieties

# Sweetpotato recommendation domains

## in Kenya

Recommendation domains for sweetpotato



# Selected sites in Kenya

DISTRICT NAME	DIVISION NAME	EADD HUB	ALTITUDE		
			Low (<700m asl)	Medium (700-1200m asl)	High (1200-2300 m asl)
NYERI	KIENI WEST	Mweiga			Mweiga (dry)
BOMET	LONGISA	Longisa		Longisa (dry)	
KEIYO	CHEPKORIO	Chepkorio			Chepkorio (wet)
NANDI	KABIYET	Kabiyet		Kabiyet (wet)	
NANDI	KAPTUMO	Kaptumo		Kaptumo (wet)	
BURET	KONOIN	Cheptalal			Cheptalal (wet)

# Selected sites in Rwanda

<b>District</b>	<b>Site</b>	<b>Production system</b>	<b>Moisture status</b>	<b>Site number</b>
<b>Nyagatare</b>	<b>Nyagatare</b>	<b>Agro- pastoral system</b>	<b>Dry</b>	<b>1</b>
	<b>Matimba</b>			
	<b>Rwimiyaga</b>	<b>Largely pastoral system</b>	<b>Dry</b>	<b>2</b>
	<b>Karangazi</b>			
<b>Lower Gatsibo</b>	<b>Kabarore</b>	<b>Agro pastoral</b>	<b>Wet</b>	<b>3</b>
<b>Upper Gatsibo</b>	<b>Ngarama</b>	<b>Semi intensive</b>	<b>Wet</b>	<b>4</b>
	<b>Kaziguru</b>			
	<b>Kiramuruzi</b>			
<b>Rwamagana</b>	<b>Kigaviro Musha</b>	<b>Semi intensive</b>	<b>Wet</b>	<b>5</b>
	<b>Munyiginya Gahengeri Ruvona Mahazi</b>	<b>Intensive</b>	<b>Wet</b>	<b>6</b>

# Varieties selected for testing in Kenya

<b>Name</b>	<b>R/V ratio</b>	<b>Flesh colour</b>
103001.152	2.53	Deep orange
Gweri	0.18	Intermediate Orange
NASPOT-1	2.84	Yellow/cream
Wagabolige	2.73	Yellow/cream
Kemb 23 (local)	1.6	Cream
Kemb 36 (Musinyamu) (local)	1.2	Cream

# Varieties selected for testing in Rwanda

<b>Name</b>	<b>R/V ratio</b>	<b>Flesh colour</b>
Mugande	---	White-fleshed
Kwezi Kumwe	---	Cream-fleshed
Cocearpedo	---	Orange-fleshed
97-062	---	Orange-fleshed
2002/154	---	White-fleshed
2002-155	---	White-fleshed
2000-040	---	Orange-fleshed
199062.1	---	Orange-fleshed
NASPOT-1	---	White-fleshed



# Progress in Kenya

# Progress activity 1: On-farm trials

- Stakeholder workshop held- attended by DFBA's (farmers), EADD staff (ILRI, ICRAF, Heifer Int.), Government extension, KARI, University of Nairobi, Egerton University and CIP
- Msc. Student recruited & registered with Egerton University
- Farmers groups and host farmers selected and sensitized
- Host farmers trained in a workshop





Kenya SASHA stakeholders team

# Progress activity 1: On-farm trials

- Participatory planting of trials together with farmers groups
- Data collection has commenced
- 1<sup>st</sup> Harvesting (75 days) due last week June & 1<sup>st</sup> week July 2010

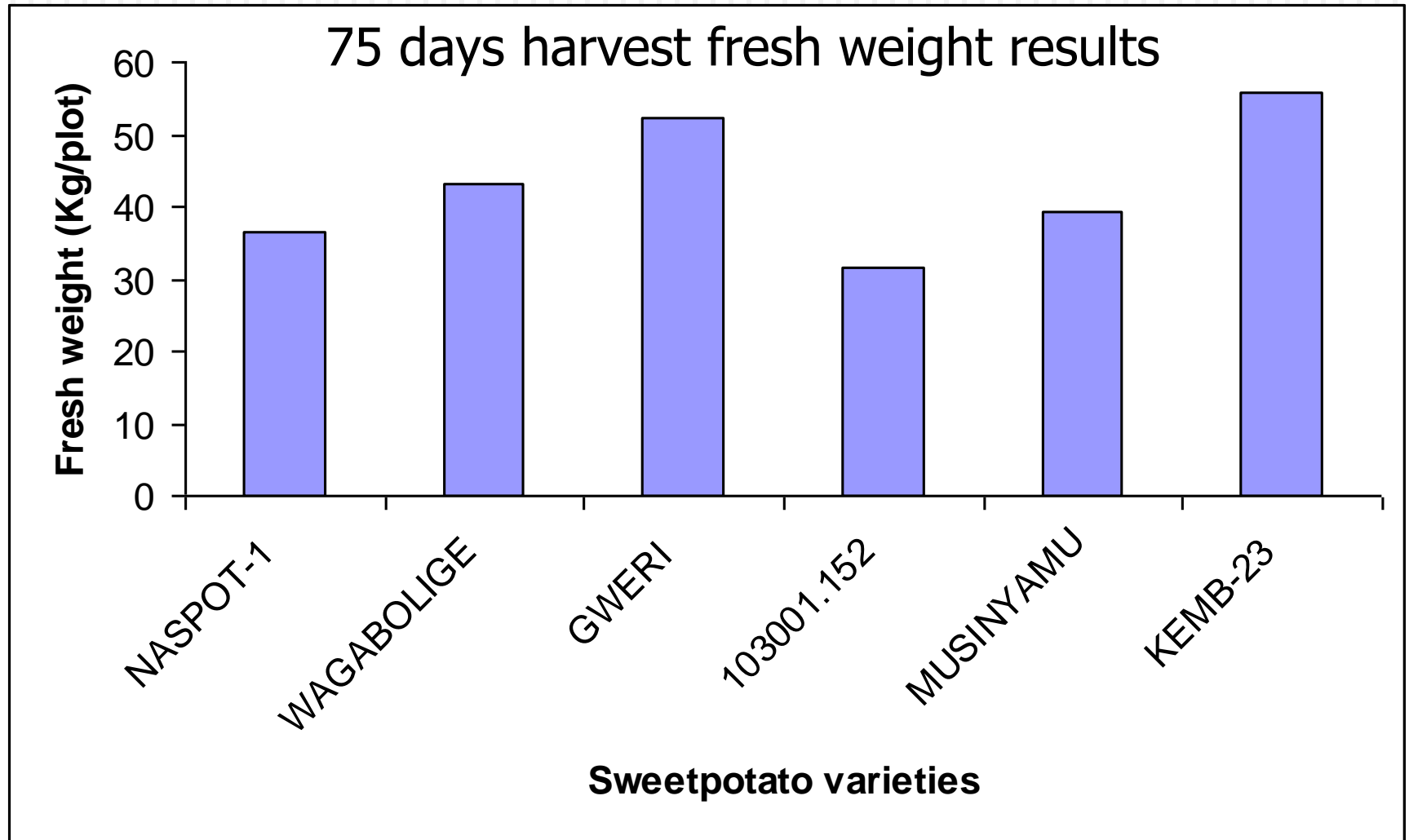
# Activity 2: Silage trial

- Msc. student recruited & registered at the University of Nairobi
- Trials designed and planted
- 1<sup>st</sup> Harvesting done and silage made in polyethene tubes

# Trials at the University of Nairobi



# Activity 2: Silage trial- Preliminary results



# Progress in Rwanda

- Activity 1 planned to happen in year 2
- Stakeholder workshop held- attended by DFBA's (farmers), EADD staff (ILRI, ICRAF, Heifer Int.), Government extension, ISAR, Umutara University, Nyagatare and CIP
- Student in the process of being recruited

# Rwanda SASHA feeds stakeholders team





**Thank you,**

**Questions, comments, suggestion?**