

La Gestion des Systèmes Fluviaux pour l'Avenir (GSFA) aka RIVERS

Senegal

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Adapting Livestock Systems to Climate Change
Livestock Innovation Lab



The Context

- We were awarded a seed grant by USAID / LCC CRSP in October 2010.
- We were selected for the continuation of our project from November 2011 to April 2015.
- Originally we were working in Mali and Senegal.
- We recently eliminated Mali activities and focused all resources on Senegal.

ASAL Lands



Transhumance Corridors near the Senegal Mali border.



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- Four research objectives designed for applied research for development:
 - 1) Study of vegetation in the Senegal River Valley.
 - 2) Transhumance corridor mapping using GPS and the input of the users of these corridors
 - Kidira, Matam, and Bakel in Sénégal

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- 3) Study of livestock production systems in the Senegal River Valley (Matam, Bakel, Kidira) using NIRS
 - Intensive: With Heifer and Yaajeende in collaboration with ISRA a study of the new intensive system being extended by the project.
 - Extensive: With our studies of the extensive production system we will be able to link vegetation study to livestock nutrition and production
- 4) Estimation of costs and benefits of cultivation, above all the irrigated cultivation of rice, compared to the livestock production systems.
 - Intensive study at the household level baseline fielded October-December 2012.
 - Repeat survey end of rainy season (November), end of cold dry season (February) end of hot dry season (June)
 - Next round end of the rainy season in November

Major Changes / Shocks in Study Area

- Droughts of 1973/4, 1985, 2011
- Manantali Dam severely limited recessional cultivation.
- SAED irrigation schemes were large scale land use changes.
- Outmigration and remittances.
- Senegal Mauritania conflict 1989, loss of land, influx of people and herds, change in migration patterns.
- Growth of permanent population in the Ferlo, no longer can migrate there as before.



Ronkh

Gae

Ndiayene-Pendao
Guede Village
Gamadji Sarre

Dodel

Fanaye

Mboumba
Aere Lao
Medina Ndiatbe

Mbane

Gandon
Mpal

K. Momar Sarr

Syer

Tessekre Forage

Labgar

Pete

Galoya Toure

Sakal

Leona

Ngeune Sarr

Nguer Malaf

Mboula

Nguidile

Niomre

Gande

Thieppebande

Nguel

Pete Ouarack

Mbeuleukhe

Kelle-Gueye

Mbediene

Coki

Kamb

Diokoul Ndiawerigne

Gueoul

Ndiagne

Thiamene

Kab Gaye

Thiolom Fall

Loro

Thiamene

Ndandane

Ngandiouf

Ngoyene

Sam Yabal

Mboro

Pekesse Mbayene

Darou Marnane

Sagatta Diolof

Meouane Merina

Dakar

Mbadiane

Dealy

Taiba Ndiaye

Koul

Thilmakha

Darou Mousty

Pire Goureye

Dinguiraye

Touba Fall

Missira

Cherif Lo

Baba Garage

Ndindy

Touba Mosque

Touba Touf

Gawane

Ngahe

Gassane

Fandene Thieneba

Lambaye

Ngom Thiakhar

Ndoulou

Noto

Ngom Thiakhar

Patar

Kael

Ndiass

Tassette

Ngondo

Ngoye

Sindial

Ndiagianao

Tattaguine

Diakhao

Sandara Sessene

Niakhar

Quadiour

Gniby

Malicounda

Diourou

Mbellacadio

Ndiago

Ngueniene

Thlomby

Dya

Mbadakhoune

Djilasse

Ngathie Naoude

Birkelane

Kahi

Fimela

Djilor

Ndiaffate

Latmingue

Palmarin Faca

Ndirinda

Keur Soce

Ndiognick

Dionewar

Bassoul

Ndiadjeng

Keur Baka Thiare

Niouro

Alassane Tall

Paos Koto

Nganda

Toubacouta

Wack Ngouna

Kayemor

Ngayene

Keur Saloum

Diane

Prokhane

Medina Sabakh

Keur Samba

Gueye

Keur Maba Diakhou

Pata

Medina Y. Foula

Missirah

Ndiamacouta

Medina Y. Foula

Sinthiang Koundara

Dialakoto

Khossanto

Diouloulou

Djibidione

Bouningling

Diaroume

Ndorna

Fafacourou

Kandia

Medina Gounass

Sare Coly Sale

Bonconto

Bandafassi

Tomboronkoto

Missirah Simana

Kafountina

Djinaki

Suelle

Sindian

Diana Malari

Sare Bidji

Sakar

Bagadadi

Dabo

Mampatim

Koukane

Linkering

Saraya

Kartiack

Fenghory

Sansamba

Diende

Kolibantang

Dioulacolon

Bagadadi

Dabo

Mampatim

Koukane

Linkering

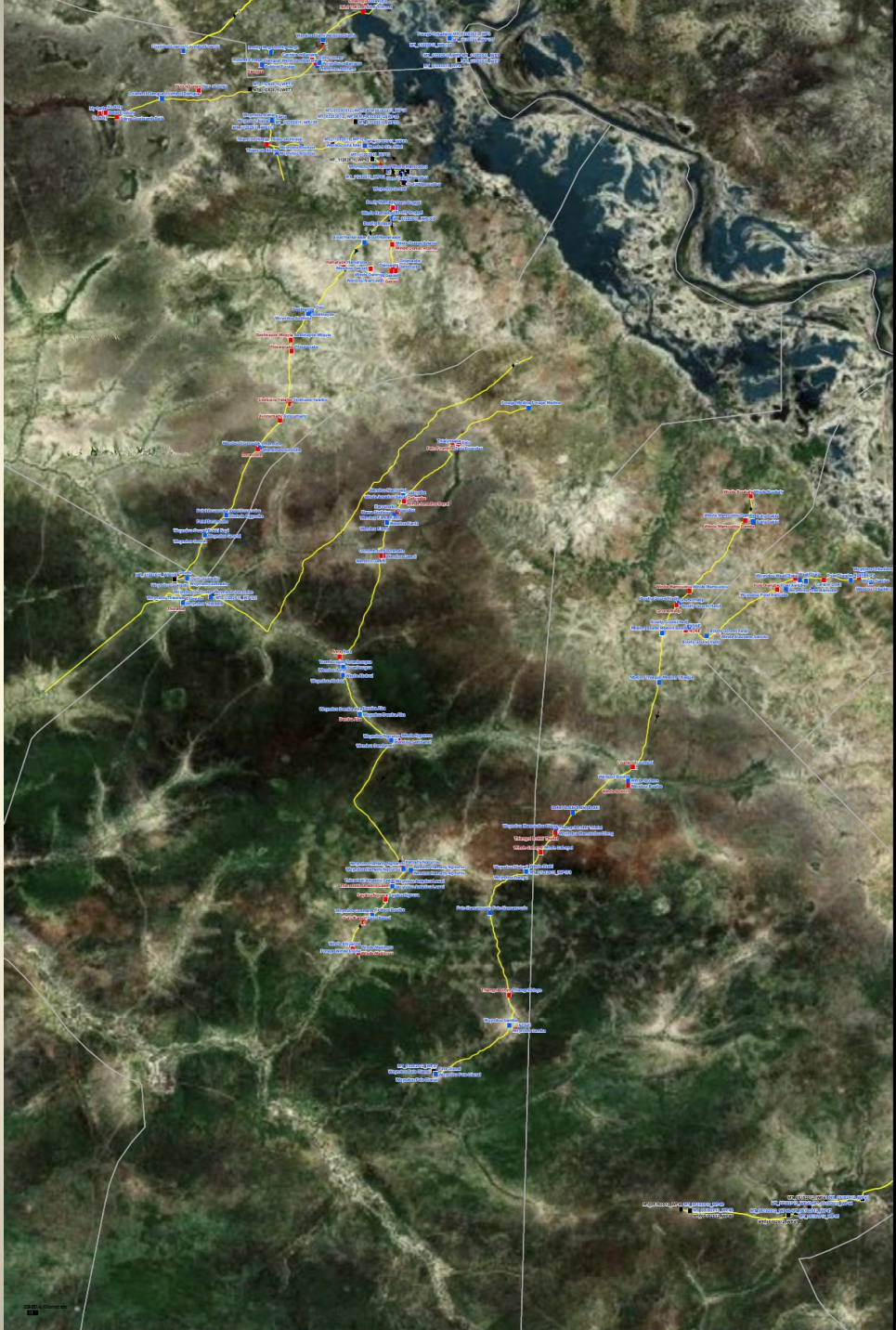
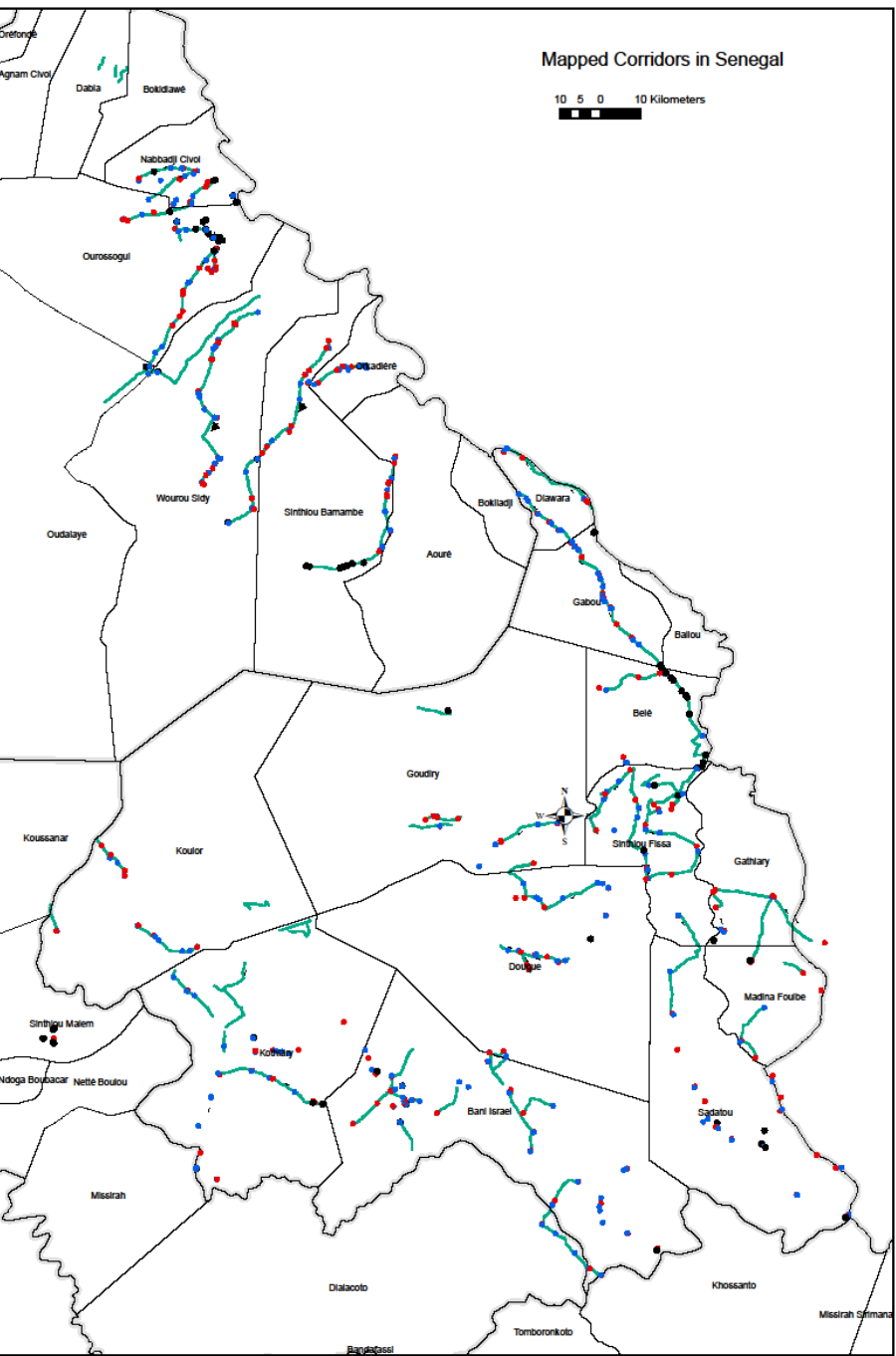
Paroumba

Saraya

Salenata

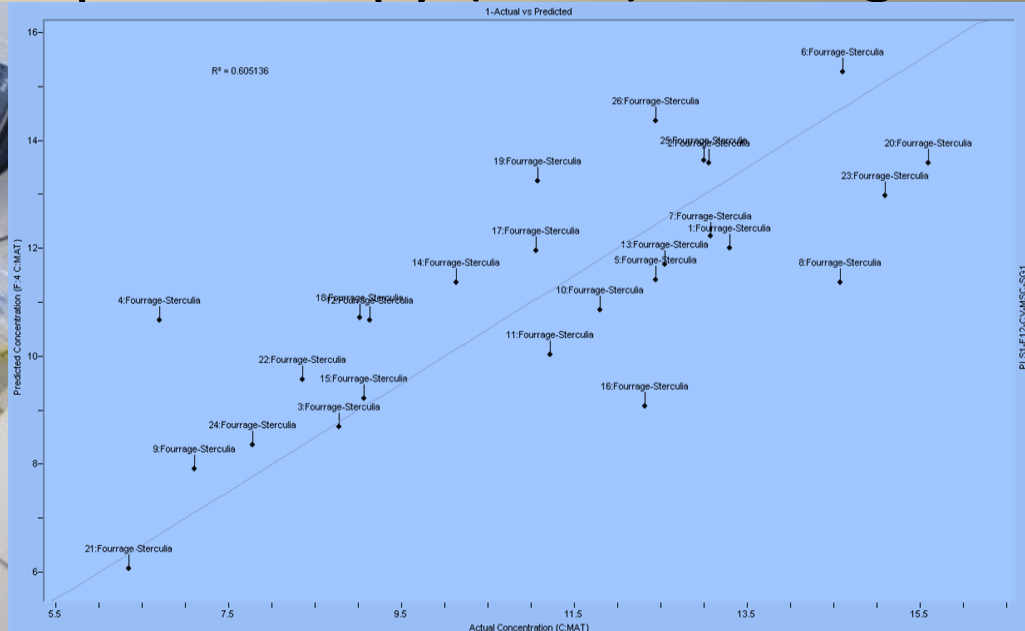
Mapped Corridors in Senegal

10 5 0 10 Kilometers





Near Infrared Reflectance Spectroscopy (NIRS) training

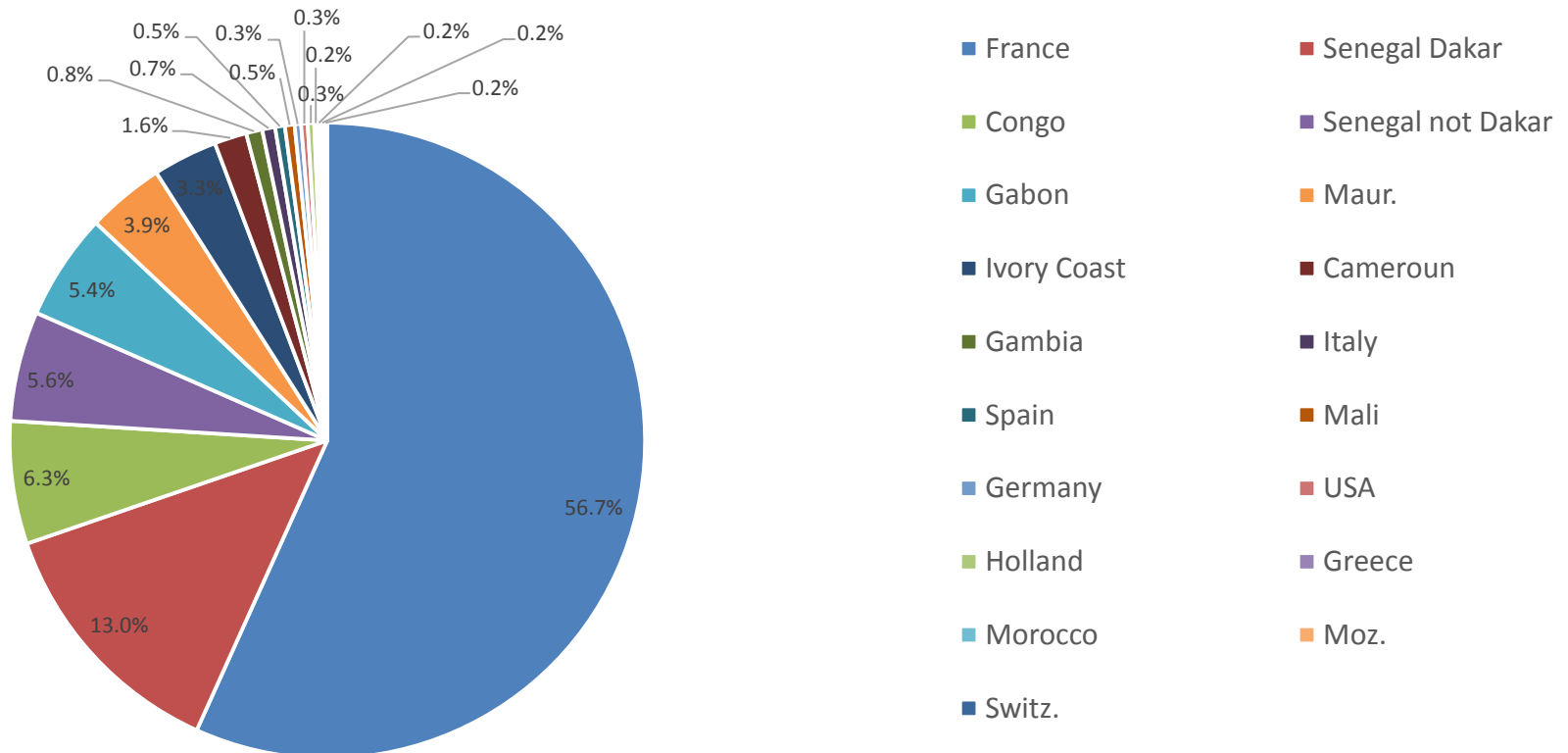


Linking NIRS to other activities

- Destructive sampling of grass in square meter samples in vegetation study, use NIRS to predict Crude Protein (CP), Neutral Detergent Fiber (NDF) and the Macro Mineral Calcium (Ca) and perhaps other measures of interest.
- Yaajeende, a USAID funded project in Senegal, in collaboration with Heifer Project is providing milk goats to people in the area.
 - We have offered to use the NIRS analysis, animal nutrition analysis, and economic analysis to identify least cost rations for the production of milk

Some results from the baseline of interest

- 89% of households listed a telephone number
- 66% of households had someone out of the area,
 - For those that had people out, on average they had 2.6 people out.



How frequently cultivated

	Corn	Sorghum	Millet	Garden	Rice	Cowpea	Peanut	Manioc
Never	21%	53%	70%	66%	66%	72%	78%	96%
Sometimes	5%	1%	1%	6%	6%	3%	0%	3%
Always	74%	47%	29%	29%	28%	25%	22%	2%

Chemical Fertilizer Use

	Rice	Corn	Garden	Sorghum	Cowpea	Millet	Manioc	Peanut
Never	72%	75%	87%	93%	93%	93%	98%	99%
Sometimes	1%	9%	4%	3%	4%	3%	2%	1%
Always	27%	15%	9%	5%	4%	3%	0%	0%

Manure Use

	Corn	Sorghum	Garden	Peanut	Millet	Rice	Cowpea	Manioc
Never	41%	66%	71%	79%	79%	79%	86%	98%
Sometimes	12%	4%	4%	2%	7%	7%	6%	1%
Always	47%	30%	24%	19%	14%	14%	9%	1%

Gender patterns differ depending on the site and group, but roughly speaking, men grow millet, maize, and sorghum; women grow cowpeas and garden crops, and rice is often both working at different tasks within rice cultivation.

1.5 fields, 6.7 ha per household on average.

Livestock Ownership

	Cattle	Sheep	Goats
0	38%	32%	39%
1-10	26%	30%	27%
10-25	11%	17%	17%
25-50	11%	13%	11%
50-100	8%	6%	5%
100+	5%	2%	1%

Annual Livestock Income

	Number sold	Value CFA	Value USD
Cattle	1.6	226,354	\$452.71
Sheep	2.8	95,044	\$190.09
Goats	1.9	32,035	\$64.07
Donkey	0.1	2,278	\$4.56
Horse	0.0	2,556	\$5.11
Chicken	0.5	758	\$1.52

22% earn income from fishing.

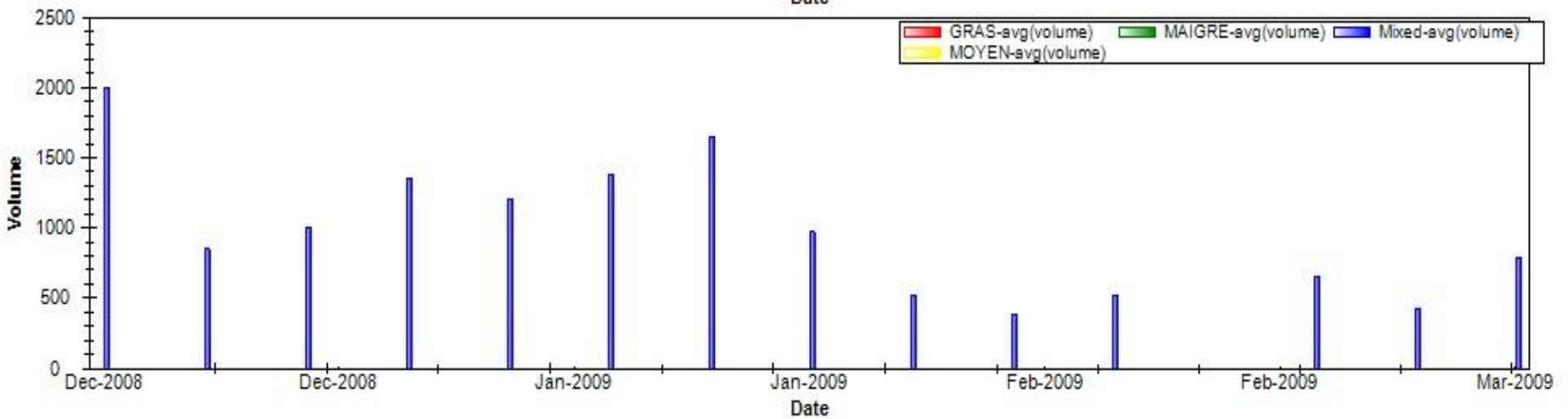
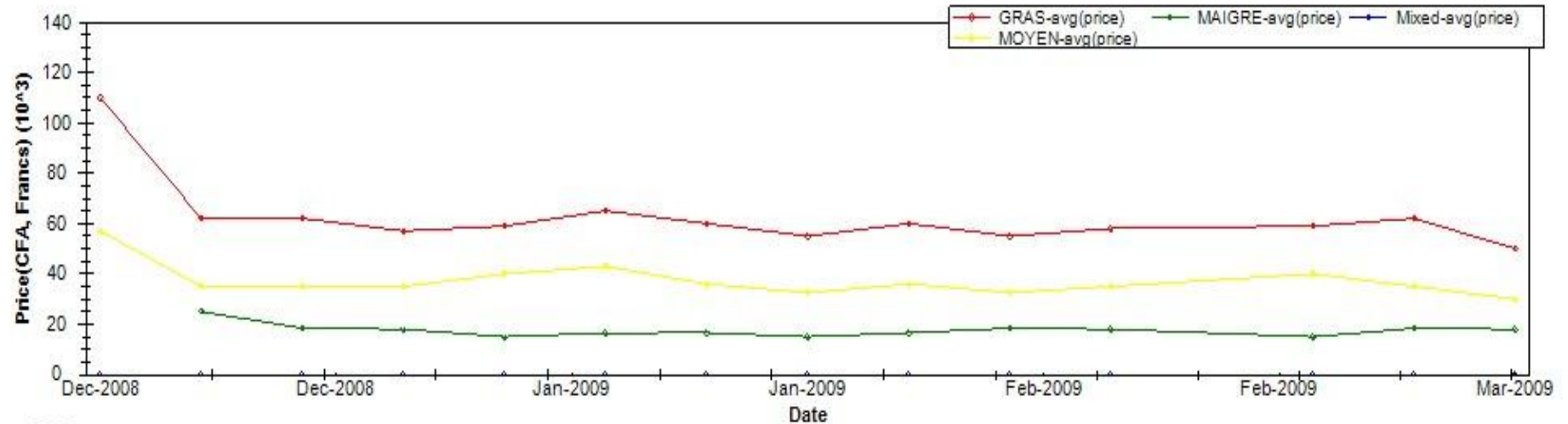
Benefit Cost

- Donors and governments look at land used intermittently by livestock producers and may assume it is 'empty' or not being used.
- Contrast value of the land converted to cultivation to cost imposed on livestock production along a corridor.
- Value of land used in livestock production is not zero; we are trying to come up with estimates to make better informed decisions about where to convert and where not to convert.
- Particularly since expansion of irrigated cultivation is going to happen; how can it be least disruptive / most beneficial?

Animal Fattening; a way to link and intensify?

Price is usually per head, not by kilogram

Market Data



Price per sheep in Kati market outside of Bamako, Mali

SHEEP

Producer price often around 50% of terminal market price, and value added operations are beginning to take advantage of this.

MAURITANIA

ALGERIA

1

Adjelhoc \$32

Kidal \$34

Kidal

2

Tombouctou \$75

Tombouctou

3

Gao

Wabararia \$55

5

Gossi \$55

Konna \$70

Mopti

Menaka \$41

NIGER

Kayes \$81

Kayes

4

Nara \$60

6

Kati \$60

Segou

8a

Bamako \$106

Bamako

9

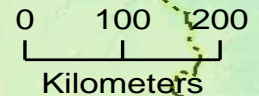
Segou \$68

Niamina \$84

Sikasso

BURKINA

GUINEA





Animal Fattening

Feed	Days	Daily Weight Gain	Net Profit per animal
60% cotton seed cake, 40% peanut leaves	76	200 g	11,020 (\$22.04)
45% cotton seed cake, 47% peanut leaves, 8% millet	84	192 g	9,415 (\$18.83)
61% cotton seed cake, 39% sorghum straw	76	124 g	5,850 (\$11.70)

From Hamidou Nantoume's work in Kayes, Mali with sheep.

Thin sheep sell for about \$40, average for \$80, fat for \$120

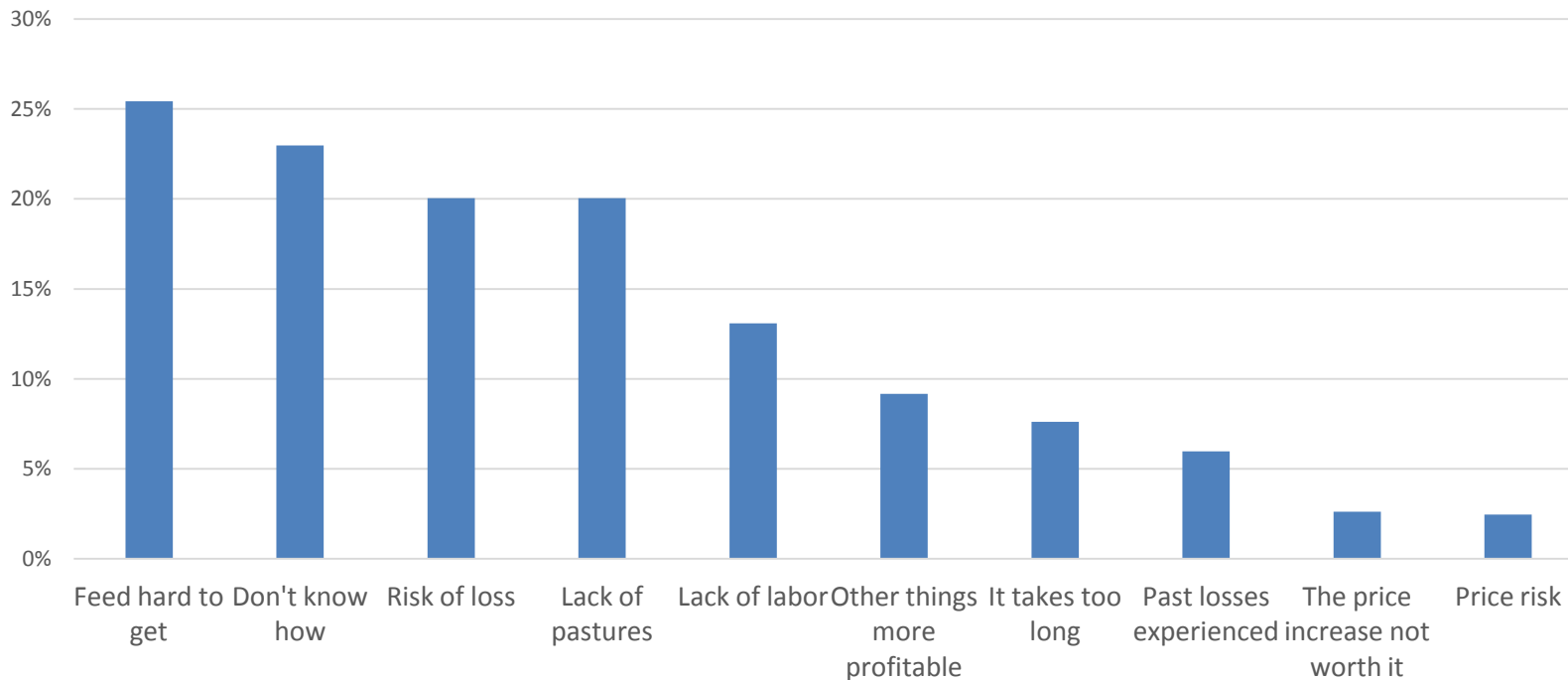
Trying to figure out using local resources least cost feeds for the animals

Also working to refine technical capacity to do feed analysis (feed trials and lab analysis including Near Infrared Spectroscopy)

Animal Fattening as an Investment (Mali)

If you obtained around \$100 dollars unexpectedly, during a time without major needs, what would you do with the money? N=1224, Gao, Mopti, and Tombouctou sites combined

	Animal to raise	Animal to fatten	Small commerce	Purchase Durable goods	Give as gift	Save in pocket	Invest in credit / coop	Loan to merchant	Loan to someone else
Normalized Rank	0.82	0.80	0.71	0.71	0.64	0.59	0.50	0.47	0.36
Number ranking in first place	136	77	82	75	28	29	5	6	1



If not fattening, why do you think it is not a good investment?

GSFA / RIVERS TEAM

- Universities
 - Syracuse University (McPeak)
 - University of Wisconsin- Madison (Turner)
 - Texas A&M University (Angerer)
- Research Institutes
 - Institut Sénégalaise de Recherches Agricoles (ISRA) in Senegal
 - Laboratoire des Mécanismes et Transfers en Géologie in France
 - *Institut d'Economie Rural (IER) in Mali*
- NGOs financed by USAID
 - CLUSA's Yaajeende Projet, Tambacounda, Senegal
 - Heifer Project, Senegal
 - *Near East Foundation, Douentza, Mali*

Thank You

- This presentation was made possible by the United States Agency for International Development and the generous support of the American people through Grant No. EEM-A-00-10-00001. The opinions expressed herein are those of the authors and do not necessarily reflect the views of the U.S. Agency for International Development or the U.S. government.