Agricultural Synergies: Sustainable Intensification of Colombia's Livestock Sector

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PRINCETON UNIVERSITY

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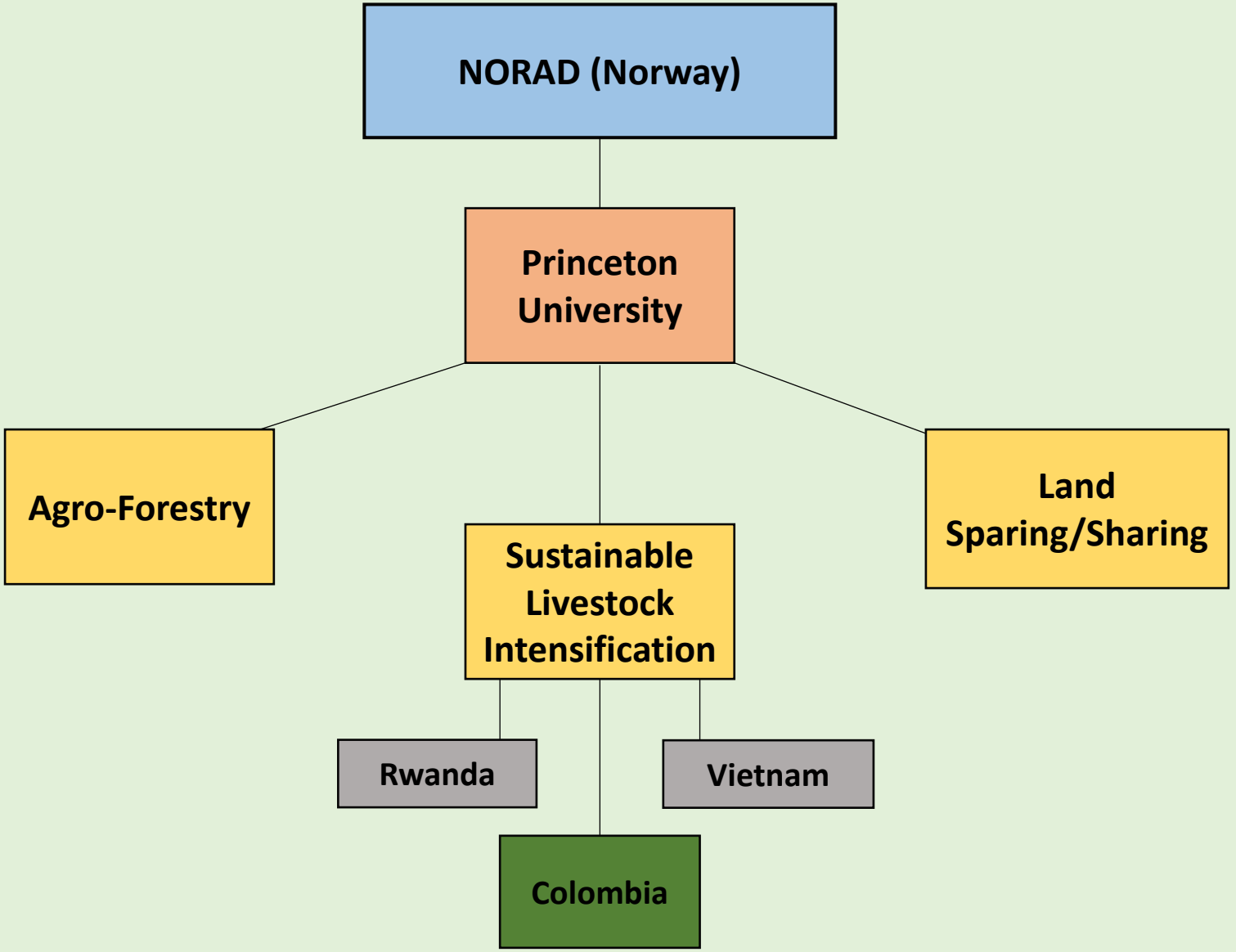
Agricultural Synergies Project



The Agricultural Synergies Project

Protecting forests and reducing greenhouse gas emissions while increasing food security

The importance of pastures:

- By 2050 production of livestock products up by 70% (WRI 2013)
- 50% of all agricultural emissions from livestock – land conversion & production
- 30% ice-free land area in livestock production, 30% of cropland for feed (Herrero, 2013), 50% of animal feed from grass (WRI 2013)

AND

- Cattle generates 6 TIMES more GHG emission per unit protein than chicken, pork & egg (WRI 2013)

Guess where?

How can we develop <u>policy guidance</u> that will increase production sustainably while conserving and/or restoring natural areas?

The Goal:

- Provide a way of sharing information about livestock systems all over the world
- Create a baseline of data of livestock production systems and the options for increasing production at the same time conserving natural areas and reducing greenhouse gas (GHG) emissions
- Work the process of “upscaling” – take information at the local level and aggregate it to have a regional or national vision for policy making.

Informing Public Policy: Gathering Information

1

Technical Information: Baseline Data of Production Systems, Geographically Specific, Emissions, and Productivity

+

Alternative Scenarios, Emissions, and Productivity

2

Where systems should be implemented : Geographic Analysis

Socio-Economic and Bio-physical Barriers to Implementing Sustainable Intensification

3

Public Policy : Costs, Instruments, Paths to Implementation

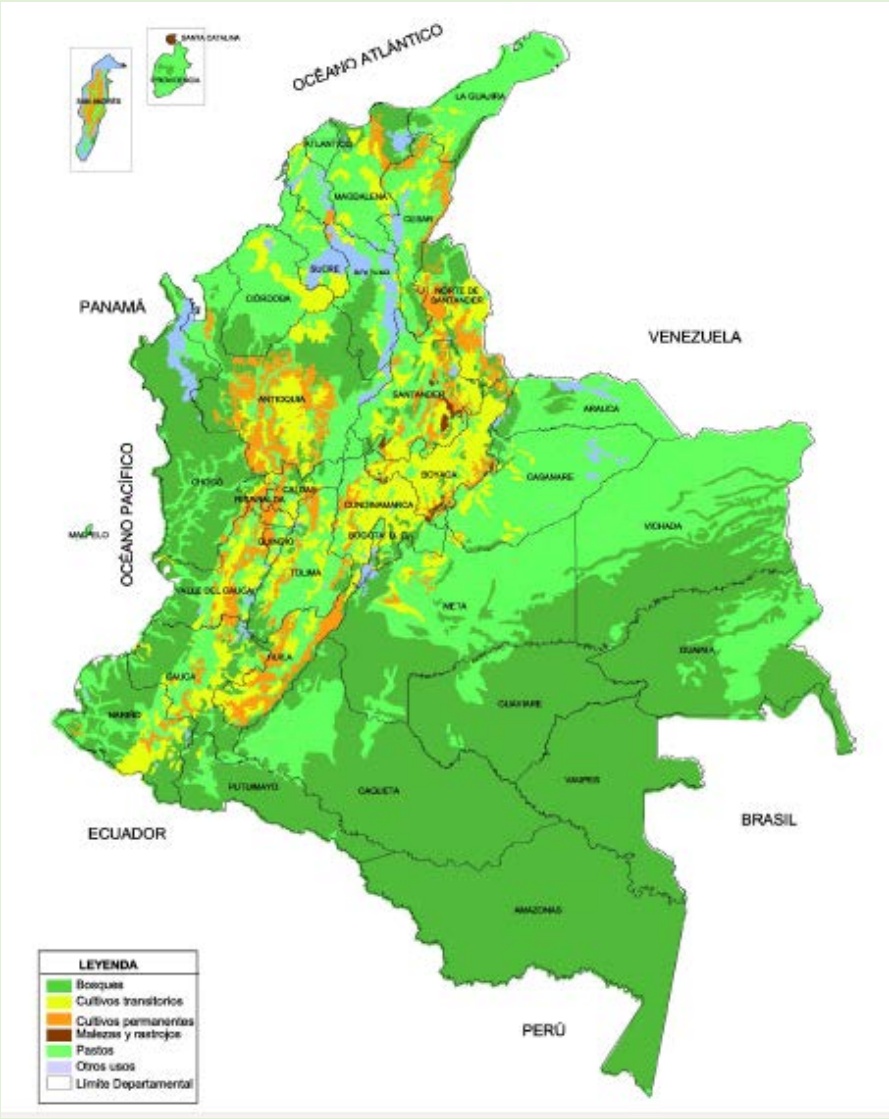
Example: Colombia's Livestock Sector

In 2011:

- 20 Million Head of Cattle TOTAL
- 900 Million Tons of Beef Produced
- 6.32 Million Liters of Milk Produced

Area of country in livestock (2010): 39.2 million hectares, 34% of total

- 81% of plots have less than 50 head of cattle; 44% less than 10
- **National Goal (PEGA 2019): Reduce 10 million hectares, increase to 40 million head cattle → from 0.6 to 1.5 head/ha**



Source: FEDEGAN 2012 & CIPAV 2011

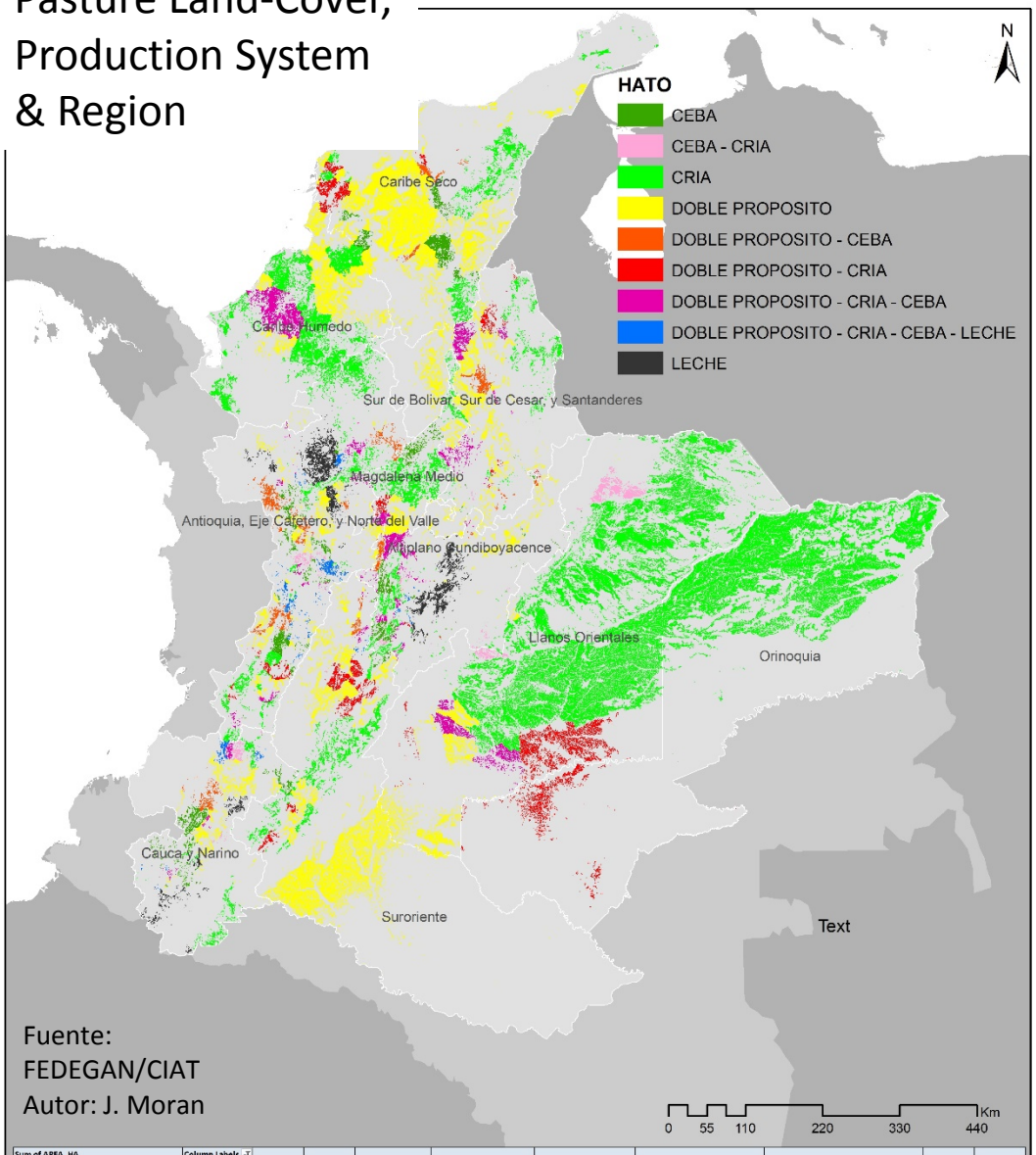
Our Approach

1. Classify Production Systems
- Beef, Dairy, Dual
- Regionally
- Management & Output

2. Up-Scaling by System & Region
- Land-area
- Emissions
- Production

3. Policy Targets by System & Region
- Costs
- Biophysical & socio-economic barriers
- Instruments
- Specific targets

Pasture Land-Cover, Production System & Region



Who We Work With

Agricultural Synergies: Princeton University

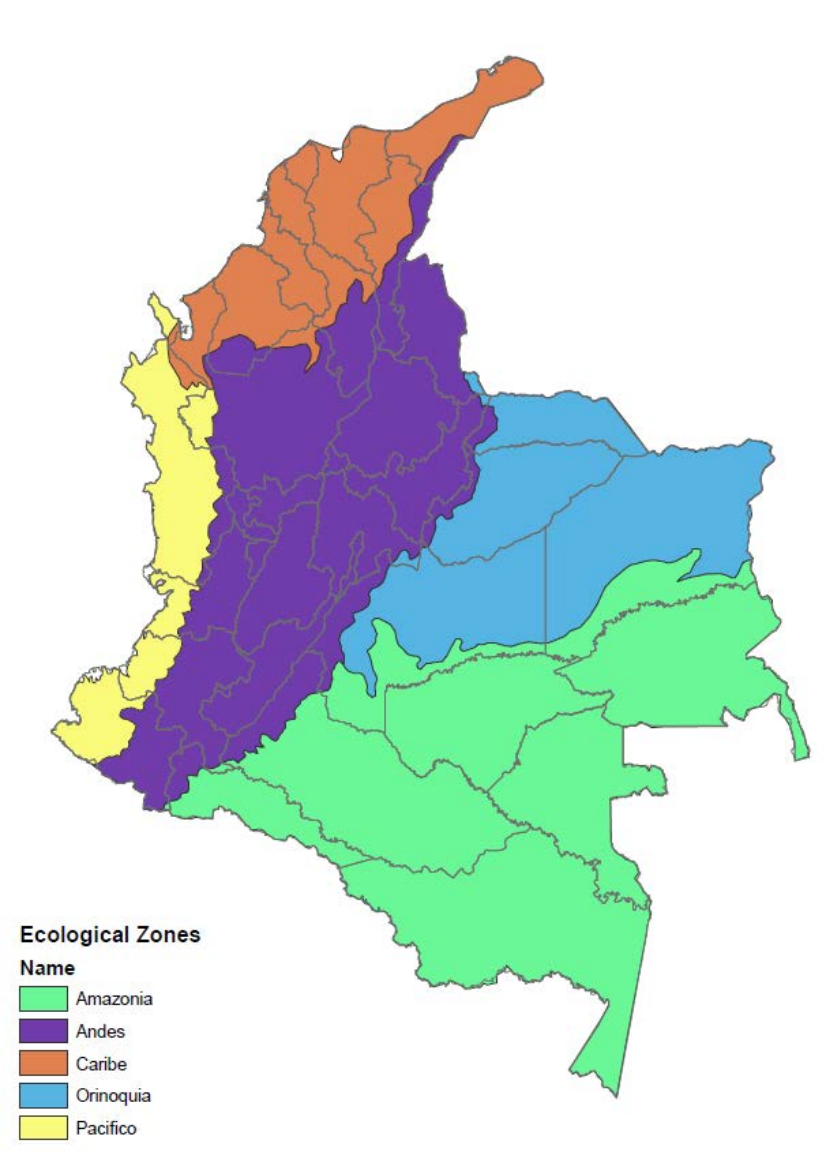
CIPAV & CIAT – Equipo de trabajo de campo y procesamiento de datos

FEDEGAN – Analisis de datos → Validar datos del campo y analisis cluster de los sistemas productivos y nivel de tecnología

CORPOICA – Tecnicos para talleres con expertos, datos de estudios gris

MADR – Formación de Política Publica – NAMA de Ganadería

Step 1. Creating Production Regions



Methodology

We are developing a webtool that can capture data from various production systems

There are three sources of information:

1) Individual Farms: The project will visit 30 farms in 5 regions of the country (Dpto Cesar, Eje Cafetero, Cundinamarca, los Llanos, Valle de Patía)
2) Information from typical or representative farms at various productivity levels and production systems in various parts of the country (with regional experts).
3) Data from fieldwork already completed (published or unpublished)

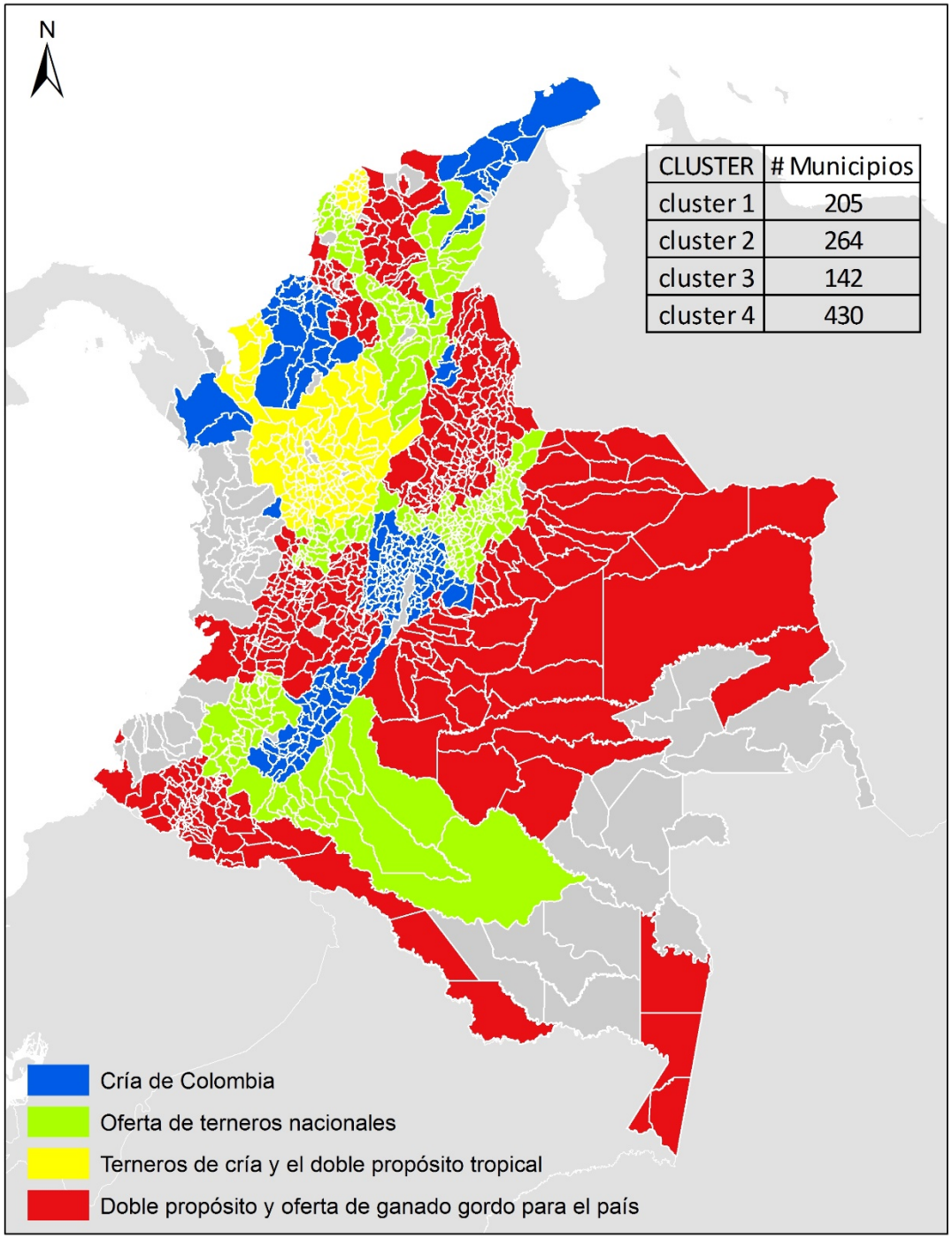
Extent of Production Systems and Representative Farms

1. Start with a region
2. Percentage of farms, production, and/or area in each production system: dairy, fattening, calf operation, dual-purpose
3. Within each production system, percentage of different productivity levels – lower, medium, high productivity for example

Information from workshops with regional experts	Information from Livestock Producers Organization (FEDEGAN)

Designing our survey instrument

Expert workshop in Popayan



Clustering producers to match our focus group data with Fedegan

Grouping farm systems by land area and number of animals

The Webtool: SIDESS

Inbox - amy.m.lerner@gm | Princeton Ag Symposium | Princeton Studies Food In | SIDESS | Take a screen capture (pri

www.agriculturalsynergies.org/Default.aspx

Apps | Google | Gmail | Yahoo! Mail | The NYT | Woodrow Wilson Sc... | Netflix | Facebook | Eportfolios@Macaul... | Pandora | wordref | Google Scholar | Other bookmarks

The Agriculture Synergies Project
Improving Food Security Sustainably While Holding Down Greenhouse Gas Emissions

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About the Project

- Agriculture Synergies
  - General Description
  - Sustainable intensification of ruminant livestock production
  - Agroforestry
  - Land sparing
- Partners
  - Research Institutions

About the Project > General Description

AGRICULTURE SYNERGIES PROJECT:
Improving Food Security Sustainably While Holding Down Greenhouse Gas Emissions

The Agricultural Synergies Project is a collaborative effort of research institutions across the world to develop detailed guidance of ways developing countries can boost food production while reducing agricultural greenhouse gas emissions. This guidance will help countries to develop Nationally Appropriate Mitigation Plans (NAMAs), and international aid agencies to evaluate them. It will also help farmer groups, private companies, and non-profit organizations to identify the most promising synergies between increases in agricultural production and reduction in emissions. The initial efforts focus on three sets of guidance:

1. Sustainable intensification of ruminant livestock
2. Land sparing
3. Agroforestry.

The project will provide initial sets of guidance by the end of 2015.

The Norwegian Agency for Development Cooperation (NORAD) is providing primary funding, with additional funding provided by the research institutions.

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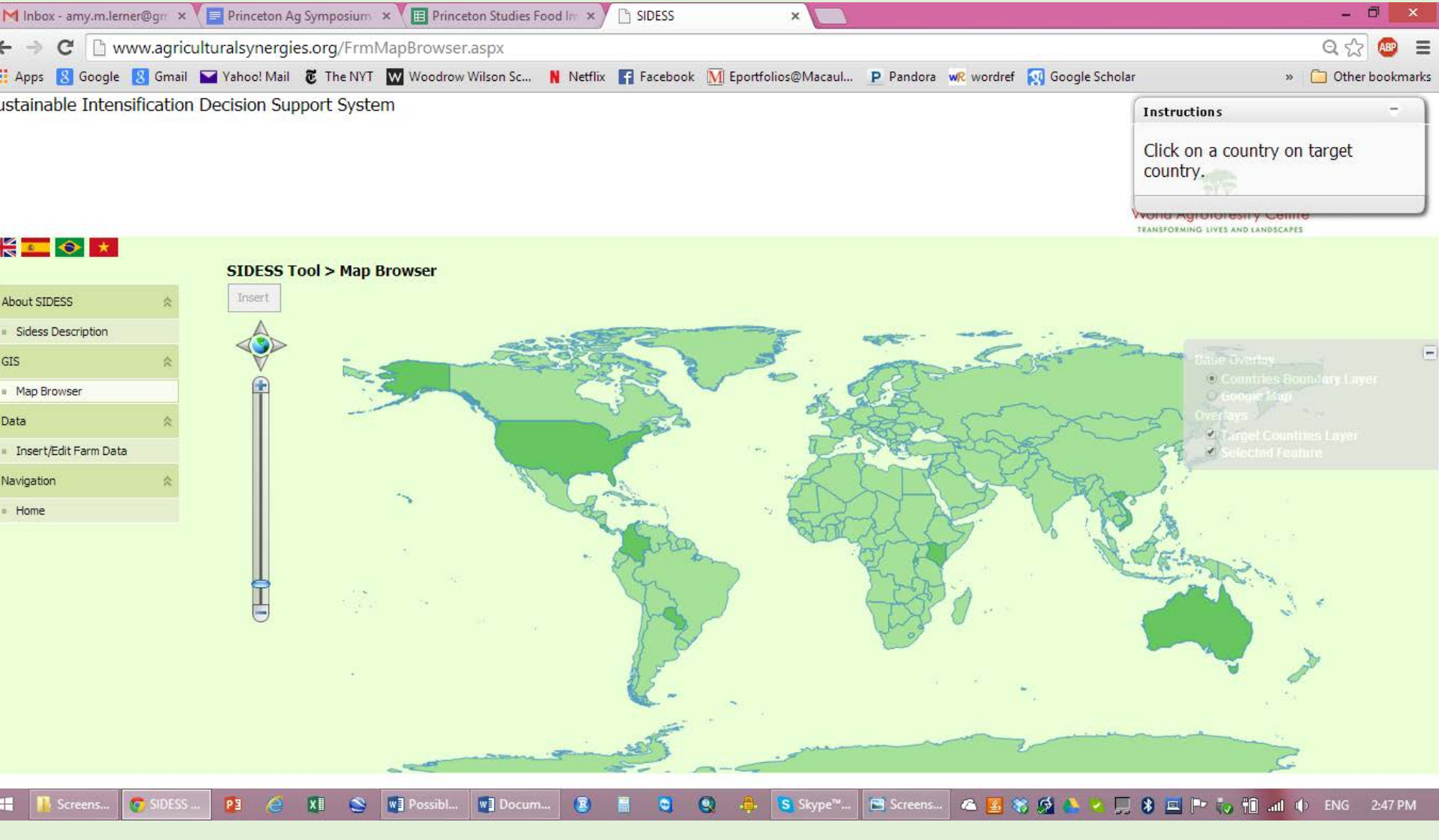
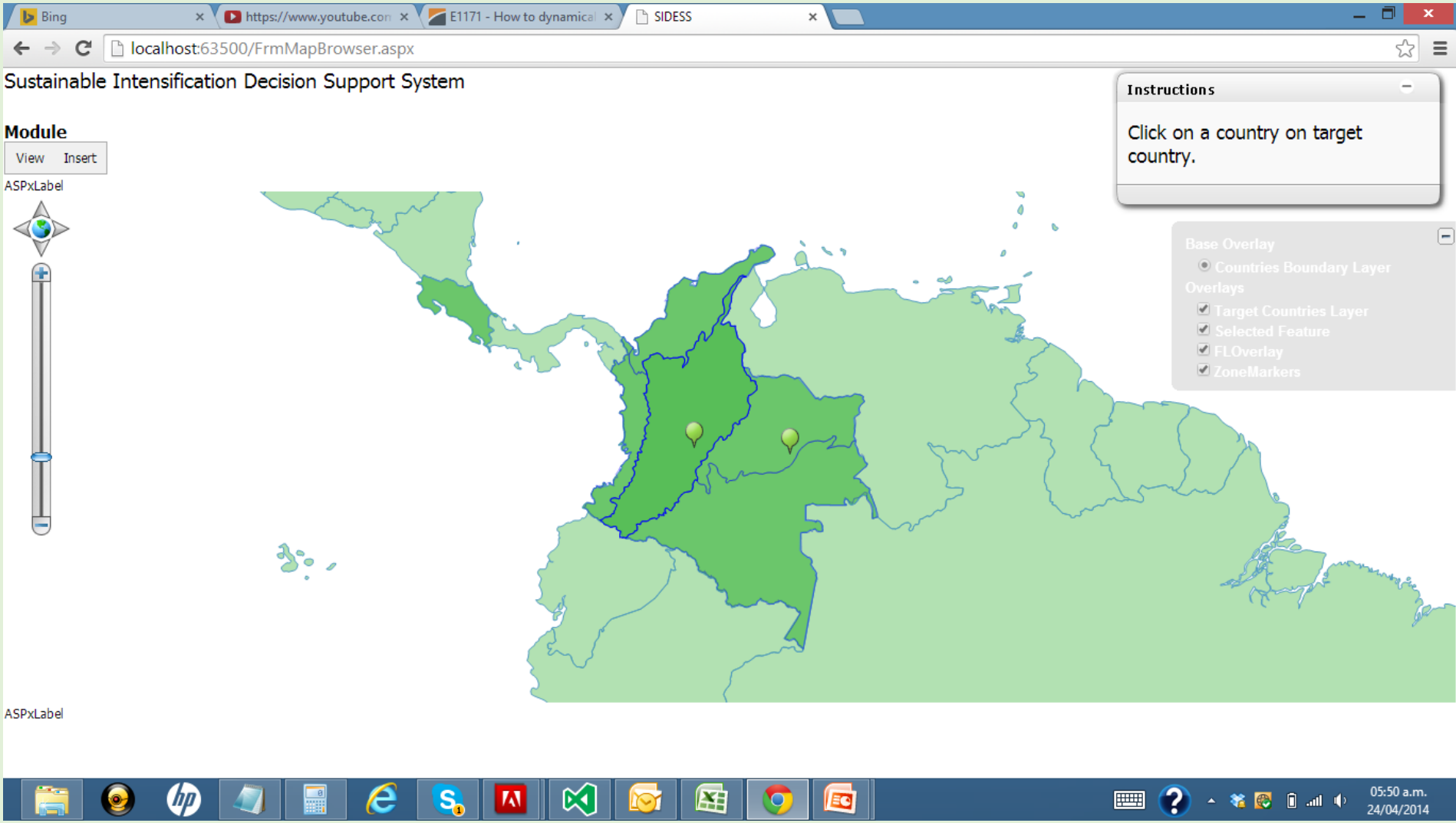
On-Line Webtool SIDESS




Bing
https://www.youtube.com
E1171 - How to dynamical
SIDESS
localhost:63500/FrmMapBrowser.aspx
Sustainable Intensification Decision Support System
Module
View
Insert
ASPxLabel
Instructions
Click on a country on target country.
Base Overlay
Countries Boundary Layer
Overlays
Target Countries Layer
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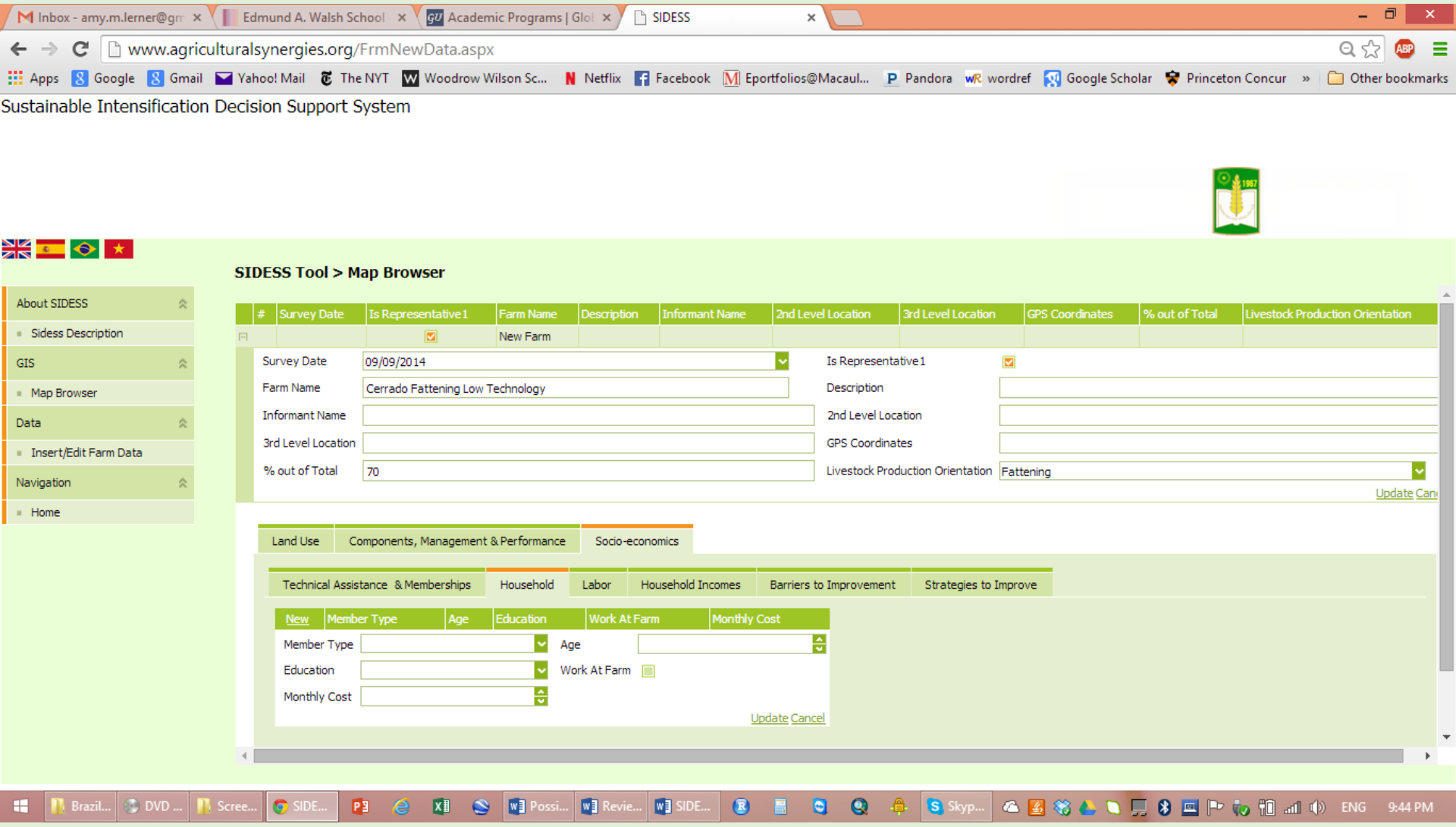
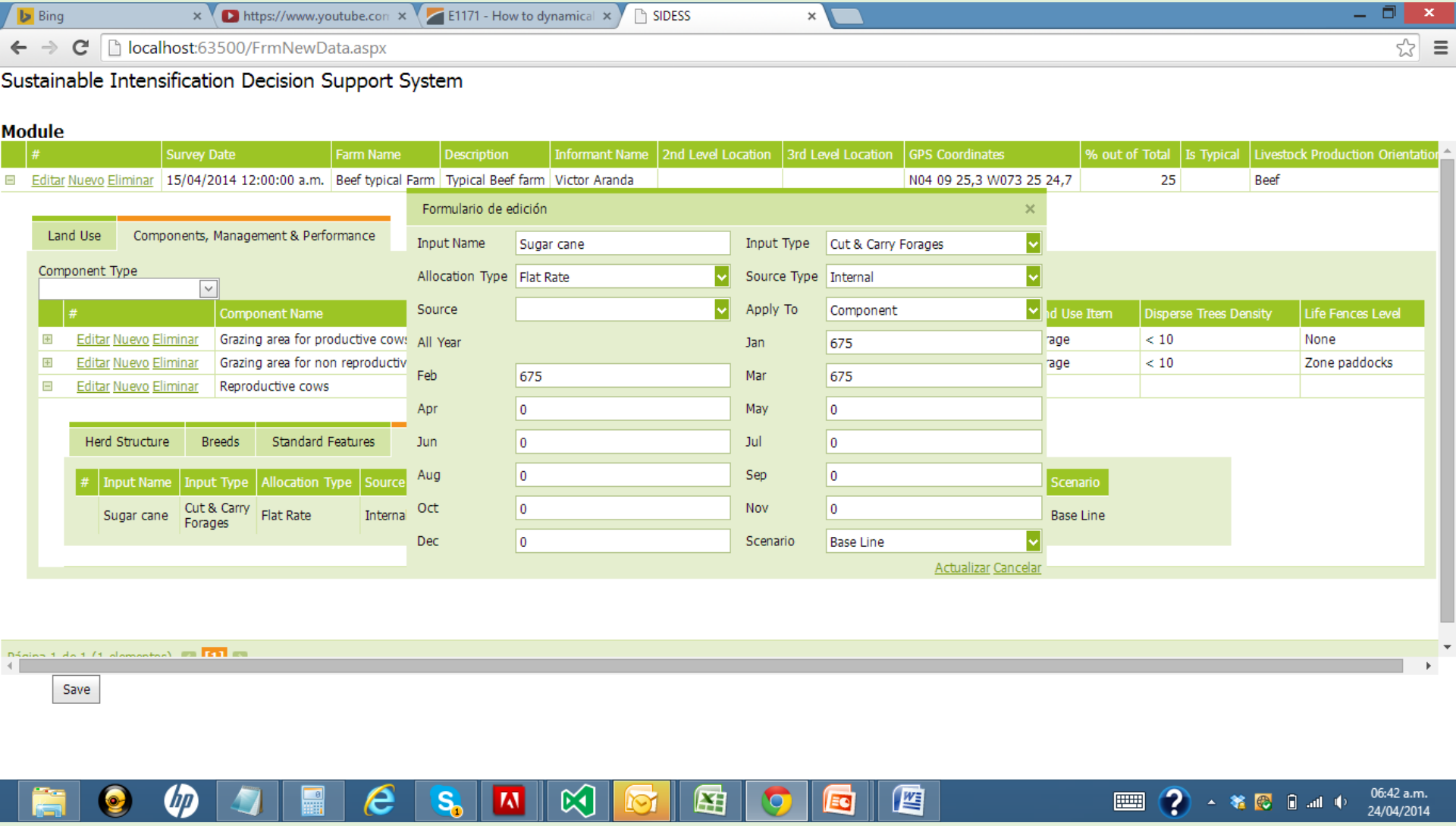
Entering Data Into SIDESS

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Sustainable Intensification Decision Support System
Module
Survey Date Farm Name Description Informant Name 2nd Level Location 3rd Level Location GPS Coordinates % out of Total Is Typical Livestock Production Orientation
Editar Nuevo Eliminar 15/04/2014 12:00:00 a.m. Beef typical Farm Typical Beef farm Victor Aranda N04 09 25,3 W073 25 24,7 25 Beef
Land Use
Components, Management & Performance
Component Type
Component Name
Editar Nuevo Eliminar Grazing area for productive cows
Editar Nuevo Eliminar Grazing area for non reproductiv
Editar Nuevo Eliminar Reproductive cows
Herd Structure
Breeds
Standard Features
Input Name Input Type Allocation Type Source
Sugar cane Cut & Carry Forages Flat Rate Interna
Formulario de edición
Input Name Sugar cane
Input Type Cut & Carry Forages
Allocation Type Flat Rate
Source Type Internal
Source
Apply To Component
All Year
Jan 675
Feb 675
Mar 675
Apr 0
May 0
Jun 0
Jul 0
Aug 0
Sep 0
Oct 0
Nov 0
Dec 0
Scenario Base Line
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d Use Item Disperse Trees Density Life Fences Level
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Scenario
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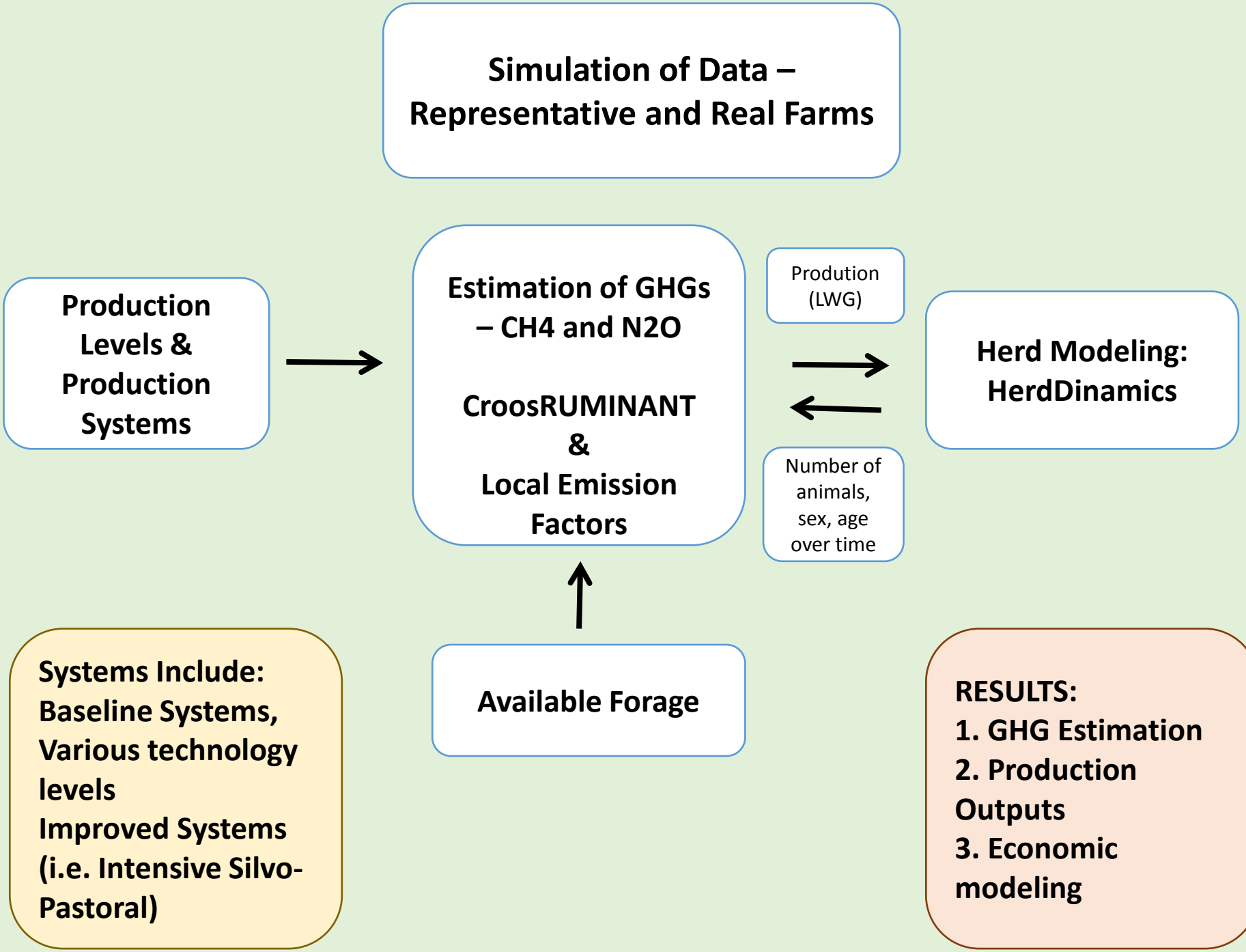
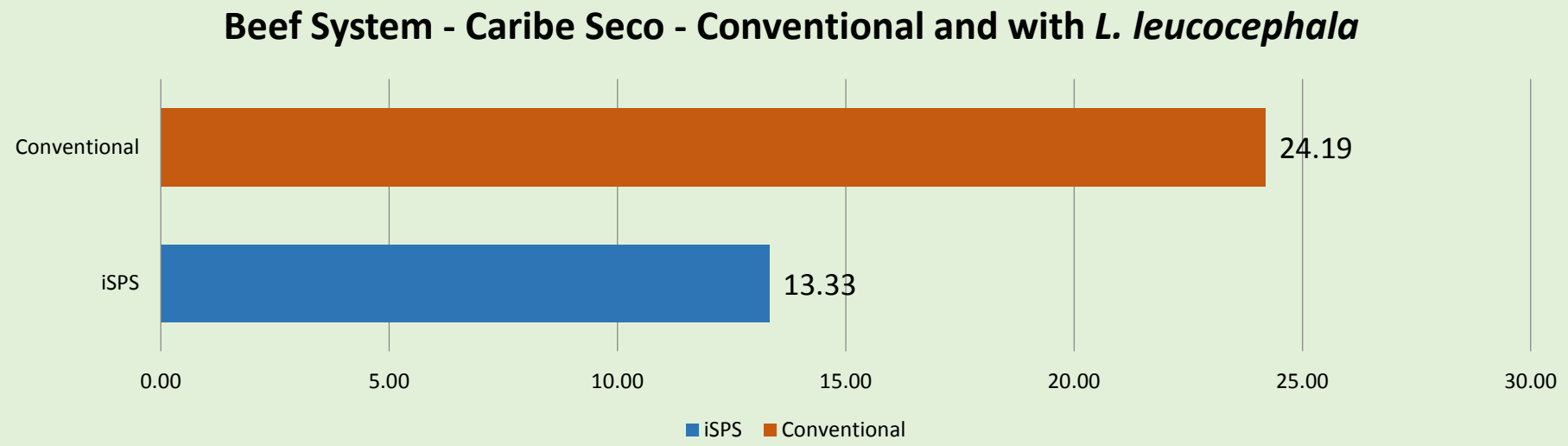
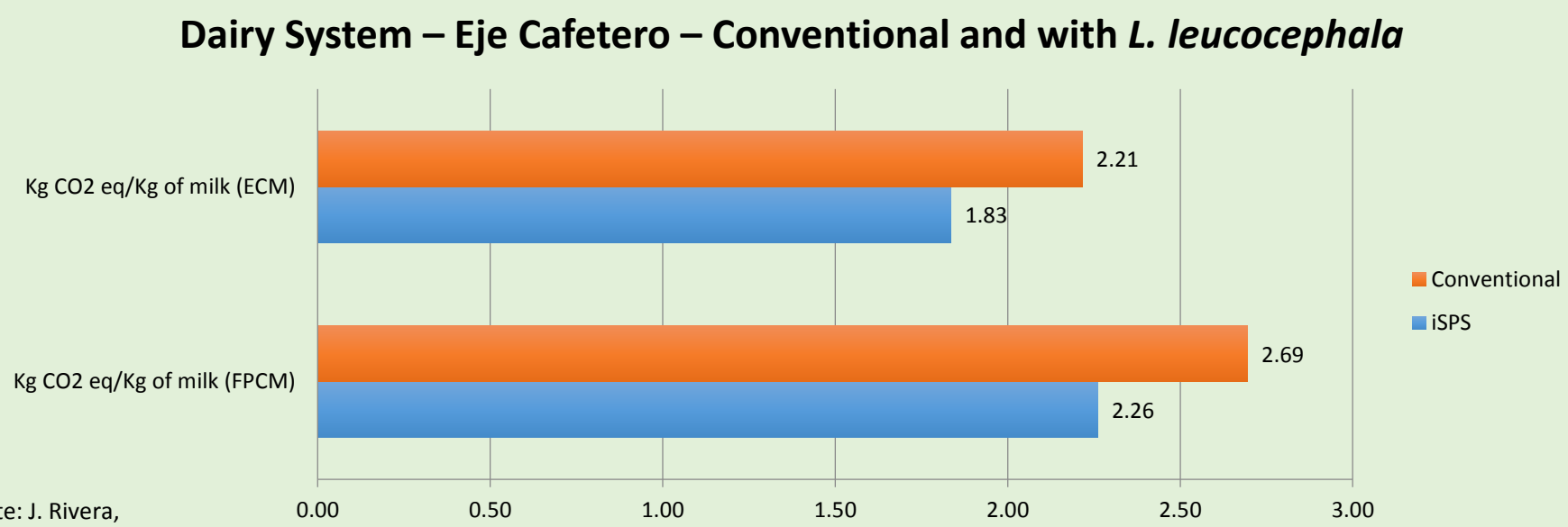

Simulation of Data – Representative and Real Farms
Production Levels & Production Systems
Estimation of GHGs – CH4 and N2O
CroosRUMINANT & Local Emission Factors
Prodution (LWG)
Number of animals, sex, age over time
Herd Modeling: HerdDinamics
Available Forage
Systems Include: Baseline Systems, Various technology levels Improved Systems (i.e. Intensive Silvo-Pastoral)
RESULTS:
1. GHG Estimation
2. Production Outputs
3. Economic modeling

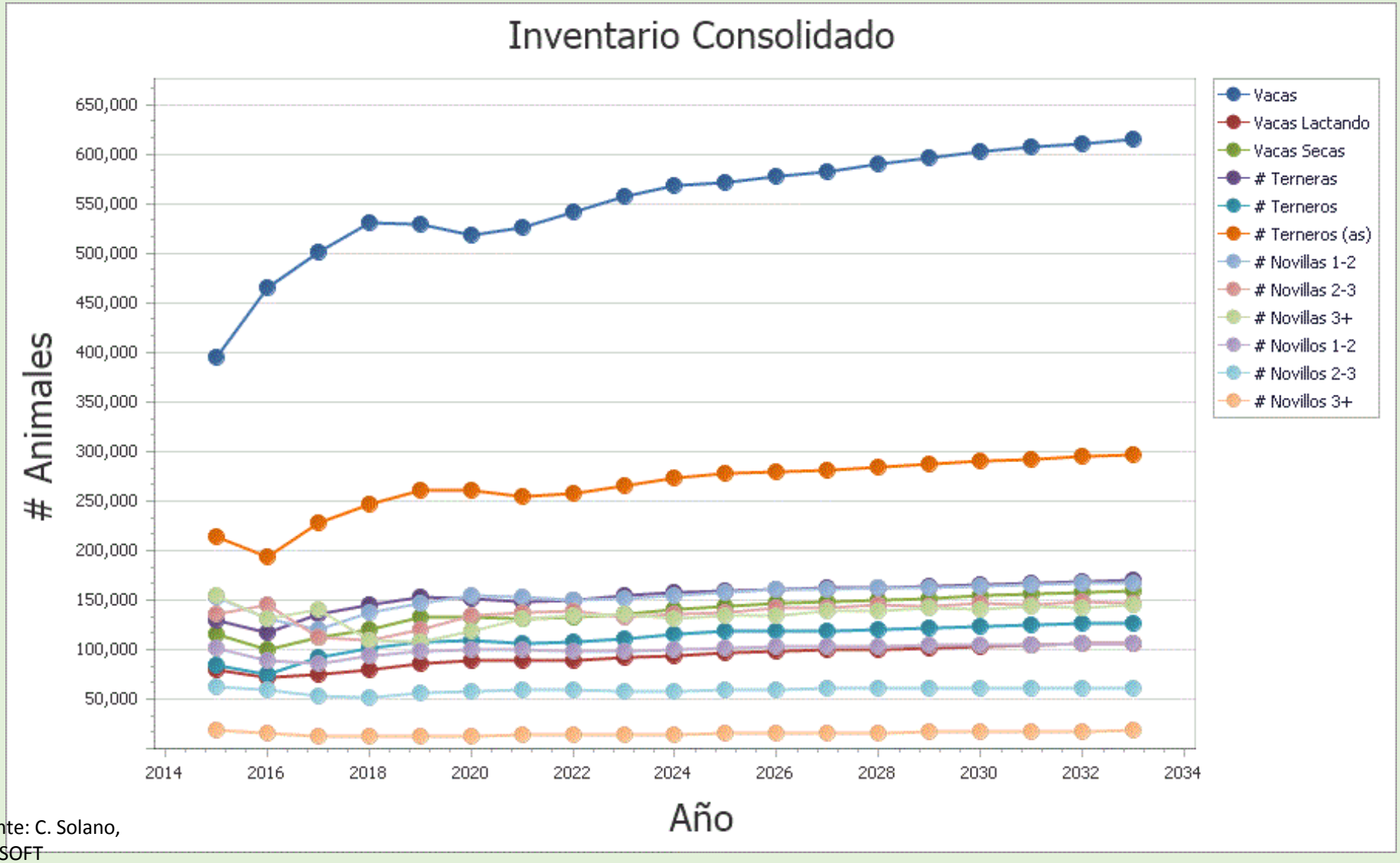
Examples of Outputs – Full System Emissions





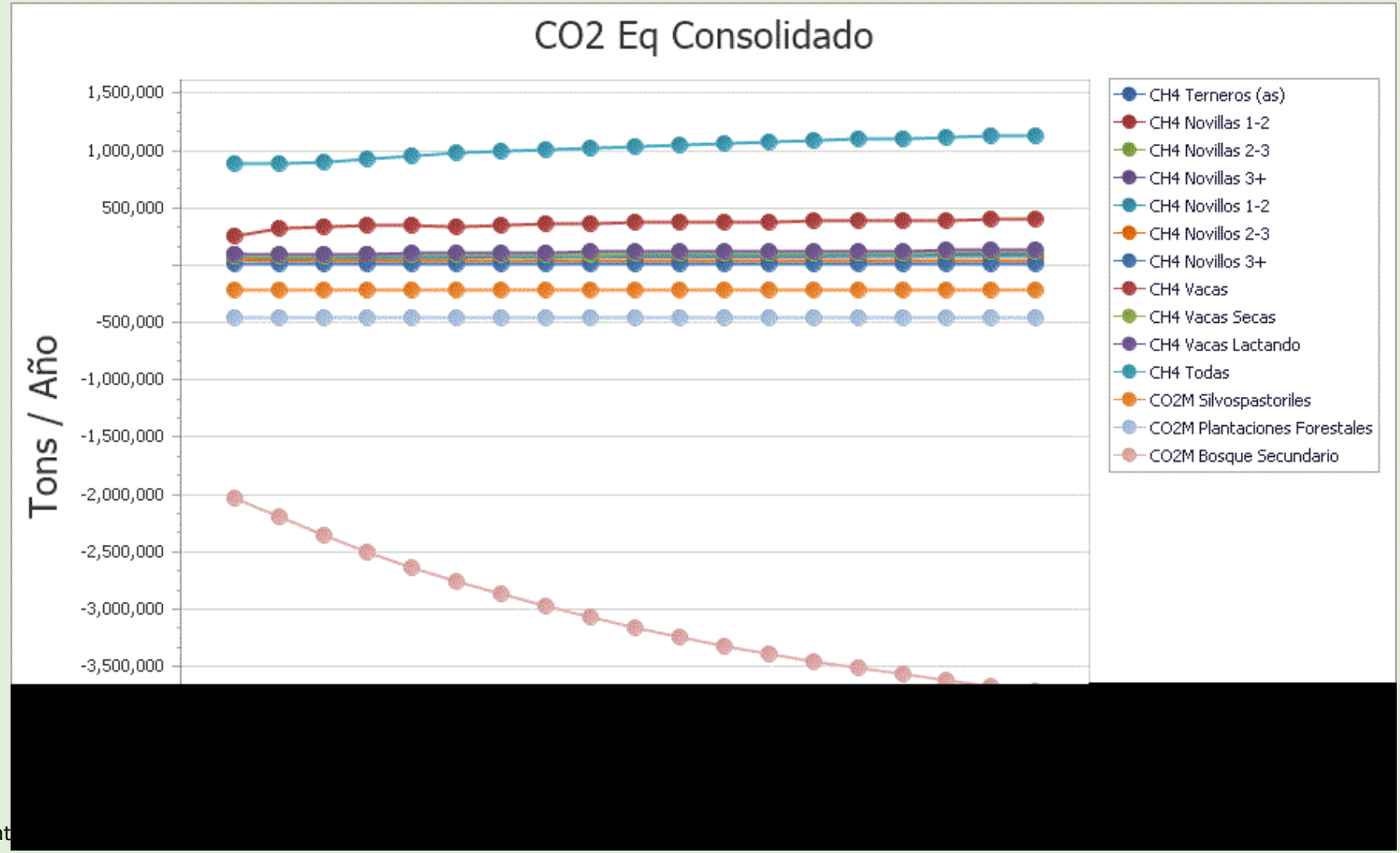
Fuente: J. Rivera, CIPAV

Example Scenarios: Herd Evolution



Fuente: C. Solano, IAP-SOFT

Example Emissions & Mitigation



Fuent
IAP-SOFT

Thank you!

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www.agriculturalsynergies.org

Colombia as an example

Examples of Outputs

Premise

- 2050 population projection 9.5 m (UN 2012)
- A growing middle class demands more meat and dairy
- 69% calorie gap between 2006 and 2050 proj. (WRI, 2013)

AND

- 40-50% of arable land in crop & pasture
- 13% of global GHG emissions from crop & livestock production – 50% of that from livestock

Necesidad de conocer los sistemas productivos– 5 regiones

Zonas representativas

Elaboración de encuestas

Productividad

Manejo

Social

Económico

Talleres regionales

Visitas a fincas

Alternativas de intensificación Sostenibles → Información

Software → Simulación

GEI → NAMA

Incremento de productividad

Dinámica económica

Costos

Ingresos

The Sustainability Factor: Intensive Silvo-pastoral Systems

- Colombia is a leader in developing intensive silvo-pastoral systems
- Impact: ↑Biodiversity; ↑Carbon storage; ↓Chemical inputs; ↑Dry matter w/ ↑Protein
- Two Pilot studies: 3.78→ 5.64 & 3.5→ 4.85 animals/ha without chemical inputs
- Increase of milk production 3.5→5.45 L/animal/day
- Better health of animals (shade, pest & parasite management)
- Cost: $2,400/ha

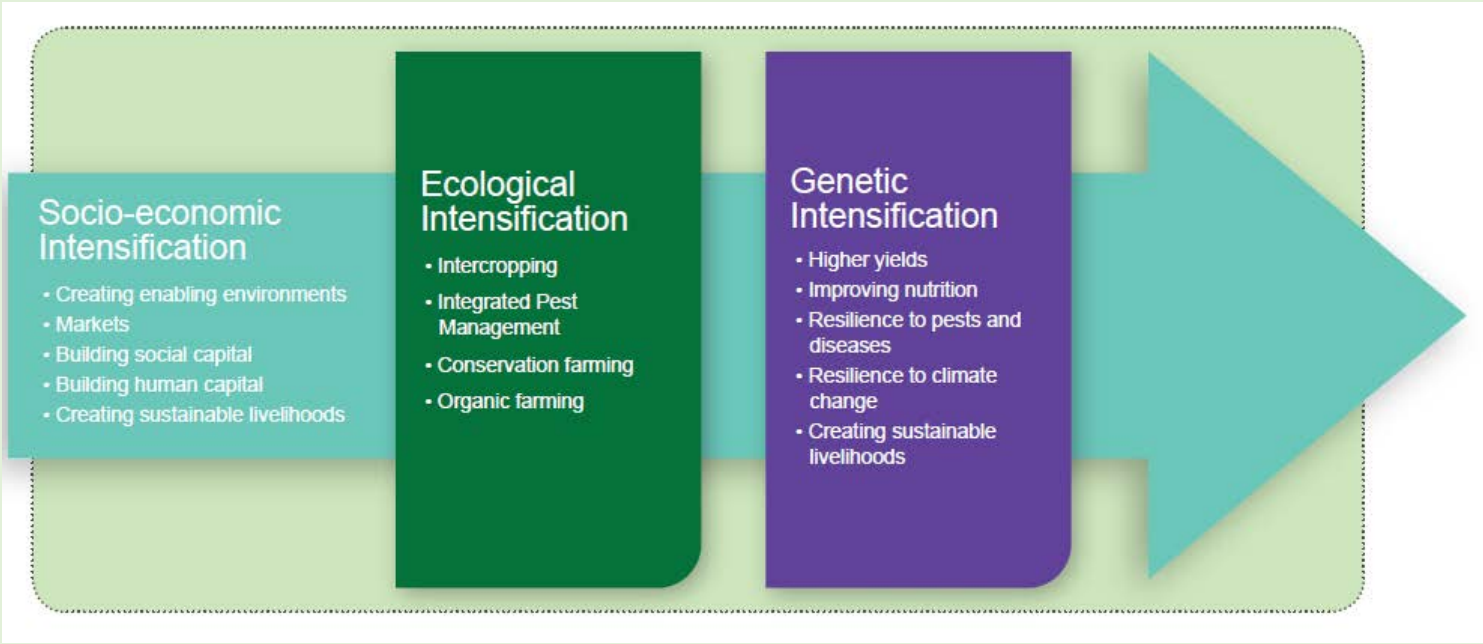
Intensive Silvo-Pastoral System at El Hatico, Cauca

Source: CIPAV 2011

Sustainable Intensification

"..At its heart **Sustainable Intensification** is about producing more outputs with more efficient use of all inputs – on a durable basis – while reducing environmental damage and building resilience, natural capital and the flow of environmental services."

(Montpellier Panel 2013; Royal Society 2009)



Geographic Analysis