Silvopastoral systems can reduce emissions and create multiple wins in beef production

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Aims of the conference and this presentation

„Evaluate options, global potentials and visions to the mitigation of greenhouse gases and the enhancement of carbon sinks by the agricultural sector“
Organising team 22.08.2018

Our analysis reveals that there are options to create multiple wins with the introduction of silvo-pastoral systems:

- Mitigation of GHG emissions plus release of land for carbon sinks
- Improvement of productivity and economics
- Improvement of animal welfare
What are silvopastoral systems?

Principles

1. Increasing plant biomass
2. Reducing soil degradation
3. Protecting water sources
4. Increase animal productivity
5. Conserve regional biodiversity
6. Ensure animal welfare
7. Ensure economic stability
Case study approach to analyse silvo-pastoral systems

Institutions participating on the case studies

1. CIPAV
2. Agri Benchmark
3. THÜREN
4. Global Agenda for Sustainable Livestock
5. PRODUCE
6. FEDEGAN
7. INTA
8. World Animal Protection
9. Campesinos y Ganaderos para la Protección de la Selva en Caquetá (CREA)
10. Pacto Caquetá
11. Reserva Natural El Hatico
12. Centre for Research on Sustainable Agricultural Systems, CIPAV
Silvopastoral systems can reduce emissions and create multiple wins...

Case 1: BEEF FINISHING
Improvement of degraded natural resources

Case 2: DUAL PURPOSE
Efficient management of natural resources

Case 3: DAIRY
Intensive sustainable production

Case 4: DAIRY
Sustainable alternatives for land use

Case 5: CATTLE BREEDING
Sustainable alternatives for land use

Case 6: DUAL PURPOSE
Alternatives to stop deforestation and ecosystem recovery

Case 7: DAIRY
Scaling of sustainable programs at regional level

Case 8: BEEF FINISHING
Scaling of sustainable programs at regional level

Case 9: FORESTRY + FINISHING
Sustainable diversification for land use

Case 10: BEEF FINISHING
Sustainable production alternatives
A framework: Efficiency matrix (Focus Area 1 GASL: Closing the efficiency gap)

### FORAGE & GRAIN PRODUCTION
- Yield/ha
- % dry matter
- Protein/energy content
- Feed digestibility
- % of total production sold/used

### ANIMAL FEEDING
- Fresh/dry matter intake
- Feed ration composition
- Feed ration intake per ingredient
- % of purchased feed
- % Home grown produced
- Protein, energy and fiber content/ingredient
- Feed conversion ratio

### LIVESTOCK PERFORMANCE
- Reproductive performance
- Nº. Animals transferred or sold to other production units

### HERD PERFORMANCE
- Reproductive performance
- Nº. Animals transferred or sold to other production units

### PRODUCTION PERFORMANCE
- Yield per unit per year
- Nº. of production periods per year
- Yield/unit per period
- Co-products per unit/year

### ANIMAL HEALTH
- Mortality distribution by age group
- % disease incidence by age group
- % disease prevalence by age group

### MANURE MANAGEMENT SYSTEM
- Methane emission per unit/year
- Manure applied as % total produced
- Synthetic fertilizer applied/ha/year
- Manure applied per ha/year

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Silvopastoral systems can reduce emissions and create multiple wins...

N, P, K, M, Ca...

### Nutrients

### Water

### Land

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Economic → Animal Welfare → Environmental → Social Impact

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Areas analysed and steps

- **Baseline** (status quo) and **scenarios** of silvopastoral systems
- Close cooperation with **producers** and **local experts**
- Analysis of the following areas and elements:
  - **Performance** and **productivity**
  - **Economics**
  - **Environment** (GHG-emissions, nutrients, soils, water, energy)
  - **Animal welfare**
  - **Social** impacts
- Calculation and aggregation of all elements in one tool
Results silvopastoral systems

Case 1 – BEEF FINISHING

COLOMBIA
Region: Cesar

Climate condition: Dry tropical

Baseline vs. SPS
From degraded soils to intensive sustainable production

SPS strategy implemented
Intensive SPS
Leucaena + Panicum + Eucalyptus

Sustainability issue to illustrate
Restoring degraded natural resources

Emphasis on SDG

FORAGE PRODUCTION
Ton. dry matter/ha

700%

compared to baseline

LAND PRODUCTIVITY
Kg. meat/ha

450%

compared to baseline

ANIMAL WELFARE
Feeding
Housing
Health
Behaviour
compared to baseline

Total area: 200 ha.
% Area under SPS

reached: 8th year

ECONOMIC RESULTS

Initial investment
USD/Ha. 1,850

Profit (USD/year)

-100,000
-50,000
0
50,000
100,000
150,000
200,000
250,000

ENVIRONMENTAL IMPACT
Kg CO₂ per 100 kg LW added

Profit (USD/year)

-100,000
-50,000
0
50,000
100,000
150,000
200,000
250,000

Base line 2 3 4 5 6 7 8 9

year

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Case study results GHG emissions

1 – BEEF FINISHING

**COLOMBIA**
Cesar

*Increased stocking rate*

Kg CO₂ per 100 kg LW added

Productivity increase mainly through increased stocking rates and not via individual animal performance → Less reduction of GHG emissions on a per kg output basis but less land needed for same production

2 – DUAL PURPOSE

**COLOMBIA**
Valle del Cauca

*Already high milk yield in Baseline*

Kg CO₂ / 100 kg ECM

3 – Dairy

**COLOMBIA**
Valle del Cauca

*Already high milk yield in Baseline (Lucerna breed)*

Kg CO₂ / 100 kg ECM

4 – DAIRY

**COLOMBIA**
Quindío

*Change of breed*

Kg CO₂ / 100 kg ECM

5 – CATTLE BREEDING

**COLOMBIA**
Quindío

Kg CO₂ per 100 kg LW added

Silvopastoral systems can reduce emissions and create multiple wins...
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**COLOMBIA**
- **Caquetá**
  - Very low milk yield in Baseline

**MEXICO**
- **Michoacán**
  - Change of breed

**ARGENTINA**
- **Misiones**
  - Increased animal performance + stocking rate
- **Corrientes**
  - No Baseline figures because there were no cattle in the Baseline
Main conclusions

- The case studies provide sound evidence that SPS simultaneously deliver gains in productivity and profitability, environmental improvements, and animal welfare benefits and thereby support a number of SDGs.

- The same quantity of product can be produced on less land which can be released to native vegetation / carbon sinks. To avoid undesired rebound-effects, good governance, policies and incentives are required.

- Public-private alliances, driven by strong farmer’s organizations, have proven crucial in overcoming technical barriers.

- National policies should support SPS adoption with specialized training for extension workers and technicians, dedicated credit lines and payment for environmental services and other incentives.
Colombia case studies

Colombia, Mexico, Argentina case studies

Silvopastoral systems and their Contribution to improved Resource Use and Sustainable Development Goals: Evidence from Latin America

Global Agenda for Sustainable Livestock

Briefing paper 172

Measuring sustainability on cattle ranches
Silvopastoral systems

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