BUSINESS CASE
Mainstreaming Sustainable Cattle Ranching Project
Cattle ranching, one of the most important sectors of the Colombian economy, generates income for more than half a million rural families, and guarantees national self-sufficiency in meat and dairy production nationwide. It also contributes 6.3% percent of the agricultural sector’s gross domestic product (GDP).

Cattle ranching is the agricultural subsector that occupies the largest share of the nation’s agricultural land, with extensive livestock production systems predominating on about 35 million hectares of pasture land. Cattle ranching systems are characterized by low profitability and high vulnerability to variations in climate, and they have considerable impacts on the environment and greenhouse gas emissions.

Cattle ranching faces significant productivity and competitiveness challenges. The production of meat and milk has remained stagnant at the national level, and exports of these products are weak. Colombia faces strong international competition from other exporters. Profits are so low that most families that rely on cattle ranching for a livelihood have few prospects of overcoming poverty.

The national production of meat and milk is facing a growing competition, as evidenced by the reduction of exports and increase of imports.

- **Beef (Millions of US$)**
  - Exports: 203.3 in 2013, 43.6 in 2014, 33.5 in 2015, 34.2 in 2016, 67.3 in 2017

- **Milk (Millions of US$)**
  - Exports: 32.8 in 2013, 9.6 in 2014, 19.5 in 2015, 0.8 in 2016, 15.0 in 2017
  - Imports: 24.6 in 2013, 78.2 in 2014, 52.8 in 2015, 108.6 in 2016, 70.7 in 2017

**Market’s main figures**

- **US$309B**
- **1.141 K Km²**
- **24M**
- **49M**
- **43M ha**
- **514K**
- **2,0B**
- **US$2,2B**
- **US$3,4B**
- **US$82M**
- **US$87M**
- **2015**
- **2013**
- **2014**
- **2016**
- **2017**

Source: FEDECAN, DANE, Cattle-ranching Sacrifice Survey, Trademap, TechnoServe analysis


**Market export (B, US$)**

- **Local beef market**
  - 770K tons
  - 8 K tons
  - 7 M tons
  - n.d.

- **Milk export**
  - 0.3B

**Market export (B, US$)**

- **US$82B**
- **US$22B**
- **US$87M**

- **Contraction of meat production**
  - **-1.7%**

- **Large Cattle Units (LCU) / ha**
  - **0.7**

- **Marginal exports**
  - **< 2%**

- **Increase of meat and milk imports, respectively**
  - **20-30%**

- **Change in competition by foreign players**
  - **35%**

- **Little resilience to climate change**
  - **0.3 to 1.3**

Source: Trademap, DANE

* Powdered and liquid milk statistics. Other milk derivatives not included
Mainstreaming Sustainable Cattle Ranching Project (MSCR)

With the objective of generating more efficient and productive conditions for raising livestock, the Mainstreaming Sustainable Cattle Ranching Project (MSCR)* is being implemented in five regions of Colombia. The project builds capacity to implement silvopastoral systems (SPS) that integrate agroforestry and livestock production, provides incentives to support good cattle ranching practices, and validates and integrates approaches to monitor the impacts of different productive systems on changes in land use, biodiversity, carbon emissions, and productivity.

* TMSCR is an alliance between the Federation of Colombian Cattle Breeders (FEDEGAN), The Nature Conservancy (TNC), The Fund for Environmental Action and Children (Action Fund), the Center for Research in Sustainable Agricultural Production Systems (CIPAV), and the World Bank, with financial support from the Department of Business, Energy and Industrial Strategy (BEIS) of the United Kingdom and the Global Environment Fund (GEF). The project also has institutional support from the Ministry of Environment and Sustainable Development (MADS) and the Ministry of Agriculture and Rural Development (MADR).

### Project Colombian Sustainable Ranching Results,

- **Impacted producers**: 4,100
- **Incremental income for producers**: Up to 523 USD/ha/year
- ** Converted hectares to SPS and SSPi**: 27,950 ha to SPS and 4,112 ha to SSPi
- **Private leveraged investment**: 16.7 USD per dollar of cooperation
- **Conserved ecosystems**: 18,238 ha of forest and other ecosystems conserved
- **2,849 ha of enriched secondary forests

### Carbon capture validated by the Mainstreaming Sustainable Cattle-Ranching Project

In tons of CO2 per hectare / year

- **Coffee ecoregion, Boyacá and Santander**
  - Dispersed trees: 3.3
  - Hedges: 2.9
  - SPS: 2.7
- **Orinoco foothills**
  - Dispersed trees: 5.4
  - Hedges: 3.7
  - SSPi: 2.4
- **Cesar River Valley and Lower Magdalena**
  - Dispersed trees: 11.0
  - Hedges: 8.4
  - SPS: 2.1

At the end of 2018, the MSCR project has registered accumulative CO2 capture of 1,050,000 tons.
To capitalize on results from the MSCR and support decision makers, TechnoServe developed a study of the “Business case for the implementation and expansion of silvopastoral systems in Colombia.” The study, based on a cost and profitability analysis of SPS, defines the potential for scaling up SPS, identifies investment opportunities, and outlines the mechanisms required to shift livestock production towards sustainable SPS and intensive SPS (iSPS).

The analysis:

1. Analyzes the characteristics, challenges, and opportunities in the cattle ranching subsector.
2. Develops a typology of representative cattle ranching systems and identifies the most commonly implemented SPS.
3. Analyzes gains in profitability for each type of ranching system in which silvopastoral practices were implemented.
4. Evaluates the incentives needed to profitably scale up the implementation of SPS and iSPS in each type of system.
5. Identifies scenarios for scaling up SPS and iSPS in each type of system and the mechanisms required for this transformation: public and private investments and incentives.

Silvopastoral systems selected for analysis

Selected archetypes

<table>
<thead>
<tr>
<th>Production focus</th>
<th>Region</th>
<th>Estimated representation</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialized milk</td>
<td>Cundinamarca &amp; Boyacá Plateau</td>
<td>&gt; 80%</td>
<td>C&amp;B</td>
</tr>
<tr>
<td>Specialized milk</td>
<td>Antioquia</td>
<td>&gt; 80%</td>
<td>ANT</td>
</tr>
<tr>
<td>Specialized milk</td>
<td>Nariño</td>
<td>&gt; 80%</td>
<td>NAR</td>
</tr>
<tr>
<td>Dual purpose</td>
<td>Cundinamarca &amp; Boyacá</td>
<td>17%</td>
<td>C&amp;B</td>
</tr>
<tr>
<td>Dual purpose</td>
<td>Antioquia</td>
<td>10%</td>
<td>ANT</td>
</tr>
<tr>
<td>Dual purpose</td>
<td>Caribbean/Atlantic</td>
<td>12%</td>
<td>CAR</td>
</tr>
<tr>
<td>Dual purpose</td>
<td>East, center and south</td>
<td>21%</td>
<td>EST</td>
</tr>
<tr>
<td>Breeding</td>
<td>East, center and south</td>
<td>30%</td>
<td>EST</td>
</tr>
<tr>
<td>Fattening</td>
<td>Caribbean/Atlantic</td>
<td>30%</td>
<td>CAR</td>
</tr>
</tbody>
</table>

* Total percentage of farms

System selection criteria:
1. Systems selected for the analysis represented 90 percent of the area where SPS were implemented under the MSCR.
2. Data on system benefits were collected systematically.

Scenarios for profitability analysis:
Costs and benefits resulting from the combination of SPS and SPSi

<table>
<thead>
<tr>
<th>Base Case</th>
<th>Indicators of farms with no intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>System</td>
<td>Percentage of area converted to silvopastoral systems</td>
</tr>
<tr>
<td>Combination 1 (MSCR)</td>
<td>Dispersed trees 8 – 18%</td>
</tr>
<tr>
<td></td>
<td>Hedges 10 – 17%</td>
</tr>
<tr>
<td></td>
<td>iSPS 1 – 2%</td>
</tr>
<tr>
<td></td>
<td>Without system 71 – 74%</td>
</tr>
<tr>
<td>Combination 2 (optimized case)</td>
<td>Dispersed trees 5%</td>
</tr>
<tr>
<td></td>
<td>Hedges 10%</td>
</tr>
<tr>
<td></td>
<td>iSPS 20%</td>
</tr>
<tr>
<td></td>
<td>Without system 65%</td>
</tr>
</tbody>
</table>

* Cash flow analysis of farms with a combination of systems that optimize cost effectiveness
* Cash flow analysis of farms with SPS and SPSi combinations implemented under the MSCR project
The benefits of SPS and iSPS are evident in five aspects of cattle ranching that directly affect profitability:

1. Increased carrying capacity: For all types of cattle ranching system, combinations 1 and 2 with SPS and iSPS represent an increase in carrying capacity of ~2-4 livestock units per hectare (LSU/ha).

2. Increased birth rates: The birth rate increases as the area under SPS and iSPS increases.

3. Increased milk productivity: Milk productivity increases up to 29 percent after three years of SPS and iSPS implementation.

4. Increased animal weight gain: Under combinations 1 and 2, animals gain more weight in a shorter period.

5. Lower production costs: Combinations with SPS and iSPS represent a continuous increase in total annual revenue.

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7 Specialized dairy and animal fattening systems are the most profitable:
- Investments in SPS for dairy and animal fattening systems are profitable within less than 10 years.
- In dairy systems, total farm income flows could support a drop in milk prices of up to $6.50 per liter. In dual-purpose (dairy and animal fattening) systems, total farm income flows are better protected from price volatility.
- Total farm income flows in meat production systems (cattle rearing and fattening) can withstand high volatility in meat prices.

<table>
<thead>
<tr>
<th>Arq.</th>
<th>Indicator</th>
<th>C.MSCR.</th>
<th>O. case.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C&amp;B</td>
<td>TIR</td>
<td>27%</td>
<td>35%</td>
</tr>
<tr>
<td></td>
<td>MCI-inc.</td>
<td>6.5x</td>
<td>29x</td>
</tr>
<tr>
<td>ANT</td>
<td>TIR</td>
<td>21%</td>
<td>23%</td>
</tr>
<tr>
<td></td>
<td>MCI-inc.</td>
<td>4.4x</td>
<td>5.1x</td>
</tr>
<tr>
<td>NAR</td>
<td>TIR</td>
<td>18%</td>
<td>27%</td>
</tr>
<tr>
<td></td>
<td>MCI-inc.</td>
<td>3.9x</td>
<td>5.4x</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Archetypes</th>
<th>Investment / ha (COP, M)</th>
<th>Investment / ha (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C&amp;B, ANT, NAR, ORI</td>
<td>$3.8</td>
<td>$1,300</td>
</tr>
<tr>
<td>CAR</td>
<td>$3.2</td>
<td>$1,100</td>
</tr>
</tbody>
</table>

Summary of profit indicators and investment needed per archetype.

Promoting the use of SPS will require a combination of intensive and non-intensive systems.

Dairy, animal fattening, and dual-purpose systems in Colombia’s Caribbean coast region are the most attractive for private investment.

For the majority of the typical cattle ranching systems, a return on investment is seen in 5–7 years, so long-term financing will be required to promote these systems.

Dairy production systems are the most vulnerable to price fluctuations.

Meat production systems (cattle raising and fattening) can withstand price drops of up to ~ 50 percent.

Efforts to convert land used in cattle ranching to SPS or iSPS should be carried out within the framework of an integrated land use planning strategy that ensures effective land use, forest conservation, and ecosystem restoration.

Appropriate incentives will be based on an evaluation of criteria related to environmental benefits as well as profitability.
- Dairy production systems are the most cost-effective option, but they have less potential for transforming land use through conversion to SPS and iSPS.
- Cattle ranching for meat production is less profitable than the other types of systems but has greater potential to transform land use through the conversion to SPS and iSPS. To realize this impact, producers will require incentives from the private and public sector; the types and combinations of incentives will vary by region and production system.
- The dual-purpose system in the Caribbean coast region offers medium profitability and a high potential impact on land transformation through the conversion to SPS and iSPS.
- Regions with high potential to transform land use by moving toward sustainable cattle ranching systems will require specific packages of incentives so that producers can adopt SPS and iSPS.

**The Business Case for Silvopastoral Systems in Colombia.**
Sustainable Cattle Ranching Project in Colombia (GCS), February 2019. Consultancy commissioned by the World Bank and funded by the UK Department of Business, Energy and Industrial Strategy (BEIS). The consultancy was led by Technoserve, with information and data provided by the GCS Project.