Towards the sustainable transformation of cattle value chains in Nicaragua

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The livestock sector in Nicaragua

• Major pillar of the economy + increasing demand
• Extensive production, soil degradation, deforestation
• 63% of GHG emissions

→ Opportunities for income and employment along the value chains
→ Interventions to mitigate GHG emissions and recuperate degraded soils.
→ Improved pasture systems for increased productivity and reduced GHG emissions
The CGIAR Research Program on Livestock and Fish

→ Pro-poor and sustainable transformation of animal-source food value chains
Greatest environmental impacts

3. ‘Multiplied’ by losses/waste, along the value chain all the way to actual consumption

2. Livestock rearing, including manure man.

1. Feed cultivation/Grazing land man.

Greatest environmental impacts

= 1 + 2
Operationalizing the framework

A. Setting the baseline
   • Stratification
   • Description

B. Ex-ante assessment
   • Intervention description
   • Local impact assessment
   • Out-scaling
Scenario of change: sustainable intensification

- Improved pastures (e.g., Brachiaria)
- Planting of trees and forage shrubs on farm
- Improved breeds
- 100% milk yield increase (700 - 1400 kg/yr)
(Ex-ante) assessments

1. Productivity:
   • Area dedicated to feed production
   • kg Fat and Protein Corrected Milk (FPCM)/ha/yr

2. GHG emissions:
   • Total emissions of methane, nitrous oxide, carbon dioxide - IPCC Tier 1 and 2
## Intervention scenarios

<table>
<thead>
<tr>
<th>Livestock category</th>
<th>1. Traditional extensive system</th>
<th>2. Silvopastoral system with improved pastures</th>
<th>3. Silvopastoral system with improved pastures and improved cattle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Annual milk production (kg/animal/yr)</td>
<td>N</td>
</tr>
<tr>
<td>Traditional dairy cows</td>
<td>8</td>
<td>700</td>
<td>12</td>
</tr>
<tr>
<td>Improved cows</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Other adult cattle</td>
<td>14</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>Calves</td>
<td>8</td>
<td>-</td>
<td>9</td>
</tr>
</tbody>
</table>
## Intervention scenarios

<table>
<thead>
<tr>
<th>Scenario</th>
<th>proportion of feed item in feed basket (%)</th>
<th>wet season</th>
<th>dry season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional pastures</td>
<td>all</td>
<td>100%</td>
<td>30%</td>
</tr>
<tr>
<td>Improved (<em>Brachiaria</em>) pastures</td>
<td>3</td>
<td>100%</td>
<td>40%</td>
</tr>
<tr>
<td>Maize - crop residues</td>
<td>all</td>
<td>0%</td>
<td>10%</td>
</tr>
<tr>
<td>Napier grass (<em>Pennisetum purpureum</em>) - green fodder</td>
<td>all</td>
<td>0%</td>
<td>50%</td>
</tr>
<tr>
<td>Leucaena leucocephala (tree legume)</td>
<td>2, 3</td>
<td>10%</td>
<td>20%</td>
</tr>
</tbody>
</table>
Productivity

**milk production increases**

- Extensive: 5,000 kg FPCM/farm/yr
- Silvopastoral: 10,000 kg FPCM/farm/yr
- Semi-intensive: 20,000 kg FPCM/farm/yr

**area for feed remains constant**

- Extensive: 5 ha/farm
- Silvopastoral: 10 ha/farm
- Semi-intensive: 15 ha/farm

**milk productivity improves**

- Extensive: 200 kg FPCM/ha/yr
- Silvopastoral: 400 kg FPCM/ha/yr
- Semi-intensive: 800 kg FPCM/ha/yr
Greenhouse Gas emissions reduce per unit product
(kg CO₂ equivalent/kg FPCM)

- Extensive
- Silvopastoral
- Semi-intensive

Legend:
- Green: Soil-Indirect N₂O
- Blue: Soil-Direct N₂O
- Orange: Manure-Indirect N₂O
- Gray: Manure-Direct N₂O
- Orange: Manure-Methane
- Blue: Enteric fermentation-Methane
Conclusions and next steps

• Allows for rapid feedback (farmers and other value chain actors)

• Input data

• Additional farm types and intervention scenarios

• Ground-truthing through stakeholder feedback

• More user-friendliness for participatory running of scenarios
Thank you!