Closing the Efficiency Gap
2017 report and outlook
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During 2017, the A.N. has continued working together with the A.N. Global Network of Silvopastoral Systems.
### Metrics and guidelines
- Efficiency matrix
  - Horizontal and vertical assessment
  - Areas Indicators

### Methodologies and tools
- Agri benchmark models
  - Modeling
    - Baseline and Alternative scenarios

### Project proposals
- Criteria for selecting projects
  - Focus groups
    - Typical farms

### Evidence
- Silvopastoral Case studies
  - Action Network on Global Network of SPS

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**Closing the Efficiency Gap**
### Efficiency matrix

<table>
<thead>
<tr>
<th>FORAGE &amp; GRAIN PRODUCTION</th>
<th>ANIMAL FEEDING</th>
<th>LIVESTOCK PERFORMANCE</th>
<th>ANIMAL HEALTH</th>
<th>MANURE MANAGEMENT SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Yield/ha</td>
<td>• Fresh/dry matter intake</td>
<td>• Reproductive performance</td>
<td>• Mortality distribution by age group</td>
<td>• Methane emission per unit/year</td>
</tr>
<tr>
<td>• % dry matter intake</td>
<td>• Feed ration composition</td>
<td>• Reproductive performance</td>
<td>• % disease incidence by age group</td>
<td>• Manure applied as % total produced</td>
</tr>
<tr>
<td>• Protein/energy content</td>
<td>• Feed ration intake per ingredient</td>
<td>• Nº. Animals transferred or sold to other production units</td>
<td>• % disease prevalence by age group</td>
<td>• Synthetic fertilizier applied/ha/year</td>
</tr>
<tr>
<td>• Feed digestibility</td>
<td>• % of purchased feed</td>
<td>• Yield per unit per year</td>
<td>• Methane emission per unit/year</td>
<td>• Manure applied per ha/year</td>
</tr>
<tr>
<td>• % of total production sold/used</td>
<td>• % Home grown produced</td>
<td>• Nº. of production periods per year</td>
<td>• Manure applied as % total produced</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Protein, energy and fiber content/ingredient</td>
<td>• Yield/unit per period</td>
<td>• Synthetic fertilizier applied/ha/year</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Feed conversion ratio</td>
<td>• Co-products per unit/year</td>
<td>• Manure applied per ha/year</td>
<td></td>
</tr>
</tbody>
</table>

**Nutrients**: N, P, K, M, Ca...

**Horizontal analysis**

1. Economic
2. Animal Welfare
3. Environmental
4. Social Impact

**Vertical analysis**

- Closing the Efficiency Gap
**agri benchmark** models (Farm level)

Focus group discussions
- Researchers
- Advisors
- Farmers
  - Local expertise

Typical farm approach
- Prevailing production systems
  - *Production factor combination*

Information gathering and compiling
- Historical Information
  - Farm records
- Applied research Information
  - (plots, pilots, trials)
- Local knowledge
  - and expertise

**BASELINE SCENARIO**
- (which issues to be solved)
  - Sustainable scenarios??

**MODELING AND CHARACTERISING**

- Economic Indicators
- Production indicators
- Animal health indicators
- Environmental indicators

Metrics and guidelines

Action Network
- Closing the efficiency gap
Criteria for selecting projects

- Focalization NRUE
- Possibility of Intervention
- Capacity Building
- Regional and Livestock Diversity
- Interaction with AN
- Impact
- Implement. Capacity
- Synergies

SPS case studies
Silvopastoral case studies

Action Network on Global Network of SPS

Institutions participating in the case studies

- 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: ANIMAL PROTECTION
  Animal protection

- Case 5: CATTLE BREEDING
  Sustainable breeding

- Case 6: DUAL PURPOSE
  Alternatives to stop degradation and ecosystem recovery

- Case 7: DAIRY
  Sustainable dairy alternatives

- Case 8: PRODUCE
  Sustainable agricultural production

- Case 9: FORESTRY + FINISHING
  Sustainable diversification

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Silvopastoral case studies
Action Network on Global Network of SPS

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

Total area: 200 ha.
% Area under SPS
70%
reached: 8th year

ANIMAL WELFARE
Feeding
Housing
Health
Behaviour
compared to baseline

ECONOMIC RESULTS
Initial investment
USD/ha.
1,850
Profit (USD/year)

ENVIRONMENTAL IMPACT
Kg CO₂ / 100 kg LW added
Silvopastoral case studies
Action Network on Global Network of SPS

Case 2 – DUAL PURPOSE

COLOMBIA
Region: Valle del Cauca
Climate condition: Semihumid Tropical

Baseline vs. SPS
From intensive production system with high dependence on external inputs to intensive sustainable production

SPS strategy implemented
Intensive SPS
Leucaena + star grass/Panicum

Sustainability issue to illustrate
Intensive sustainable production

Emphasis on SDG

FORAGE PRODUCTION Ton. dry matter/ha
11.6% compared to baseline

Total area: 30 ha.
% Area under SPS
47% reached: 4th year

LAND PRODUCTIVITY Tons ECMilk/ha
117% compared to baseline

ECONOMIC RESULTS
Initial investment
USD/Ha.
2,360

ANIMAL WELFARE
Feeding
Housing
Health
Behaviour
compared to baseline

Profit (USD/year)

ENVIRONMENTAL IMPACT
Kg CO₂ / 100 kg ECM

Closing the Efficiency Gap
Action Network
Closing the efficiency gap
Evidence
Silvopastoral case studies
Action Network on Global Network of SPS

Case 3 – DAIRY

COLOMBIA
Region: Valle del Cauca
Climate condition: Dry Tropical

Baseline vs. SPS
From intensive production system with high dependence on external inputs to intensive sustainable production

SPS strategy implemented
Intensive SPS
Leucaena + star grass/Panicum

Sustainability issue to illustrate
Intensive sustainable production

Emphasis on SDG

FORAGE PRODUCTION
Ton. dry matter/ha

- Total area: 135 ha.
- % Area under SPS reached: 9th year

52% compared to baseline

LAND PRODUCTIVITY
Tons ECMilk/ha

52% compared to baseline

ANIMAL WELFARE
Feeding, Housing, Health, Behaviour

Compared to baseline

ECONOMIC RESULTS

Initial investment
USD/Ha.

2,600

Profit (USD/year)

ENVIRONMENTAL IMPACT
Kg CO₂ / 100 kg ECM

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Evidence
Silvopastoral case studies
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**Case 4 – DAIRY**

**COLOMBIA**
Region: Quindío
Climate condition: Semihumid Tropical

**Baseline vs. SPS**
From intensive production system with high dependence on external inputs to intensive sustainable production

**SPS strategy implemented**
Intensive SPS
Leucaena + star grass

**Sustainability issue to illustrate**
Intensive sustainable production

**Emphasis on SDG**
12 Responsible Consumption and Production
13 Climate Action

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**FORAGE PRODUCTION**
Ton. dry matter/ha
29%
compared to baseline

**LAND PRODUCTIVITY**
Tons ECMilk/ha
117%
compared to baseline

**Total area**: 50 ha.

**% Area under SPS**: 100%
reached: 5th year

**ECONOMIC RESULTS**
Initial investment
USD/ha.
1,635

**ANIMAL WELFARE**
Feeding
Housing
Health
Behaviour
compared to baseline

**ENVIRONMENTAL IMPACT**
Kg CO₂ / 100 kg ECM

Closing the Efficiency Gap

Evidence

Closing the efficiency gap
Silvopastoral case studies
Action Network on Global Network of SPS

Case 5 – CATTLE BREEDING

COLOMBIA
Region: Valle del Cauca
Climate condition: Semihumid Tropical

Baseline vs. SPS
From degraded soils to sustainable production

SPS strategy implemented
Trees in rows + star grass

Sustainability issue to illustrate
Restoring degraded natural resources

Emphasis on SDG

FORAGE PRODUCTION
Ton. dry matter/ha
653%
compared to baseline

LAND PRODUCTIVITY
Kg LW/ha
1,114%
compared to baseline

Total area: 37 ha.
% Area under SPS
68%
reached: 5th year

ECONOMIC RESULTS
Initial investment
USD/Ha.
1,195
Profit (USD/year)

ANIMAL WELFARE
Feeding
Housing
Health
Behaviour
compared to baseline

ENVIRONMENTAL IMPACT
Kg CO₂ / 100 kg LW added

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Evidence
Silvopastoral case studies

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Case 6 – DUAL PURPOSE

COLOMBIA

Region: Caquetá

Climate condition: Humid Tropical

Baseline vs. SPS
From deforested areas for extensive production to intensive sustainable production, releasing land for ecosystem recovery

SPS strategy implemented
Scattered trees + Tithonia diversifolia

Sustainability issue to illustrate
Alternatives to reduce deforestation and ecosystem recovery

Emphasis on SDG

FORAGE PRODUCTION

Ton. dry matter/ha

436%
compared to baseline

LAND PRODUCTIVITY

Tons ECMilk/ha

909%
compared to baseline

Total area: 170 ha.

% Area under SPS

59%
reached: 10th year

ECONOMIC RESULTS

Initial investment
USD/Ha.

1,621

Profit (USD/year)

ANIMAL WELFARE

Feeding
Housing
Health
Behaviour

compared to baseline

ENVIRONMENTAL IMPACT

Kg CO₂ / 100 kg ECM

Closing the Efficiency Gap

Evidence
Case 7 – DAIRY

MEXICO

Region: Michoacán

Climate condition: Dry subtropical

Baseline vs. SPS
From intensive production system with high dependence on external inputs to intensive sustainable production

SPS strategy implemented
Intensive SPS - Leucaena + Guinea

Sustainability issue to illustrate
Scaling up Intensive sustainable production

Emphasis on SDG

FORAGE PRODUCTION
Ton. dry matter/ha
181%
compared to baseline

LAND PRODUCTIVITY
Tons ECMilk/ha
290%
compared to baseline

Total area: 50 ha.

% Area under SPS
100%
reached: 5th year

ECONOMIC RESULTS
Initial investment
USD/Ha.
1,274

Profit (USD/year)

ENVIRONMENTAL IMPACT
Kg CO₂ / 100 kg ECM
Silvopastoral case studies
Action Network on Global Network of SPS

Case 8 – BEEF FINISHING

MEXICO
Region: Michoacán
Climate condition: Dry subtropical

Baseline vs. SPS
From extensive land use to intensive sustainable production

SPS strategy implemented
Intensive SPS - Leucaena + Guinea

Sustainability issue to illustrate
Scaling up Intensive sustainable production

Emphasis on SDG

FORAGE PRODUCTION
Ton. dry matter/ha
187%
compared to baseline

LAND PRODUCTIVITY
Kg LW/ha
684%
compared to baseline

Total area: 60 ha.
% Area under SPS
100%
reached: 6th year

ECONOMIC RESULTS
Initial investment
USD/Ha.
1,274

Profit (USD/year)

ENVIRONMENTAL IMPACT
Kg CO₂/100 kg LW added

-40,000
-20,000
0
20,000
40,000
60,000
80,000
100,000
120,000
140,000
160,000
180,000

Baseline
SPS

Feed
Manure N
Manure methane
Enteric fermentation

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Silvopastoral case studies
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**Case 9 – FORESTRY + FINISHING**

**ARGENTINA**

Region: Misiones

Climate condition: Humid subtropical

**Baseline vs. SPS**
From monoculture land use (forestry) to diversified land use

**SPS strategy implemented**
Hybrid Pine + Axonopus grass

**Sustainability issue to illustrate**
Sustainable diversification for land use

**Emphasis on SDG**

**FORAGE PRODUCTION**
Ton. dry matter/ha

750% compared to baseline

**LAND PRODUCTIVITY**
Kg LW/ha

9150% compared to baseline

**Total area:** 240 ha.

**% Area under SPS**
100% reached: 16th year

**ECONOMIC RESULTS**

Initial investment
USD/Ha.

1,029

**ENVIRONMENTAL IMPACT**

Kg CO₂ / 100 kg LW added

**Profit (USD/year)**

Initial investment
1,029 USD/Ha.

Total area: 240 ha.

**Kg CO₂ / 100 kg LW added**

- Base line
- SPS

- Feed
- Manure N (N)
- Methane N
- Enteric fermentation

**Forage Production**

750% compared to baseline

**Land Productivity**

9150% compared to baseline

**Economic Results**

Initial investment
1,029 USD/Ha.

Total area: 240 ha.

**Environmental Impact**

- Base line
- SPS

- Feed
- Manure N (N)
- Methane N
- Enteric fermentation

**Profit (USD/year)**

Initial investment
1,029 USD/Ha.

Total area: 240 ha.

**Environmental Impact**

- Base line
- SPS

- Feed
- Manure N (N)
- Methane N
- Enteric fermentation
Silvopastoral case studies
Action Network on Global Network of SPS

Case 10 – BEEF FINISHING

ARGENTINA
Region: Corrientes
Climate condition: Humid subtropical

Baseline vs. SPS
From extensive land use to intensive sustainable production

SPS strategy implemented
Hybrid Pine + Axonopus grass

Sustainability issue to illustrate
Sustainable alternatives for land use

Emphasis on SDG

FORAGE PRODUCTION
Ton. dry matter/ha
78% compared to baseline

LAND PRODUCTIVITY
Kg LW/ha
221% compared to baseline

Total area: 950 ha.
% Area under SPS
70% reached: 16th year

Environmental Impact
Kg CO₂ / 100 kg LW added

ECONOMIC RESULTS
Initial investment
USD/ Ha.
808

Profit (USD/year)

Figure: Closing the Efficiency Gap - Impact of SPS Strategy on Land Use Productivity and Environmental Impact.
What is next?

- Launching a Publication on SPS case studies at the MSP meeting (Mongolia, June 2018)
- Modelling (models, methodologies, tools)
- Presenting project proposals to IKI and Gates foundation
  Joint proposal with the GN of SPS and A.N. Restoring Value to Grasslands
Methods and approaches for assessing adaptation, adaptation co-benefits and resilience

Focus on models and tools for modeling (assessing) sustainable options

How this A.N. contributes to the COP 23 and the GFFA?
Ensuring food Security and Nutrition

By promoting better dissemination and application of technologies and innovations, in particular regarding breeding, feeding and livestock husbandry

Conserving natural resources, protecting the environment and addressing climate change

Promotes sustainable and resource-efficient livestock production, including through innovations, integrated systems, agro-ecological methods and organic farming, inter alia by phasing out unsustainable policies and practices

Supports international research collaboration on reducing the intensity of GHG emissions from livestock production systems, including by pasture restoration and soil carbon sequestration
Thanks