



INITIATIVE ON
Livestock and Climate



Research topics within the Tropical Forages Program – experiences on livestock sustainable management in Colombia

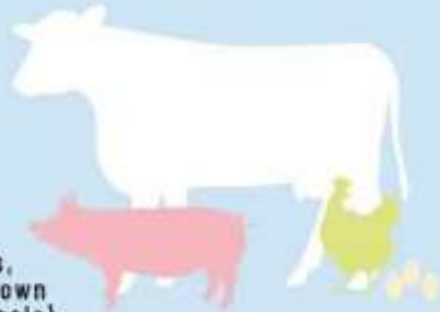


Jacobo Arango
12th World Conference
of Science Journalists
Medellín | March 29, 2023

Why are livestock and forages important: the facts

**17
BILLION**

The estimated total number of livestock worldwide (including cattle, sheep, goats, pigs, chickens, and about a dozen lesser known species, like guinea fowl, yaks, and camels).



4.9 Bha

About two-thirds of the world's total agricultural area

is used to feed livestock, including

3.3 Bha
of grazing land

25%

Total crop area



The value of livestock as a global asset reaches

**USD3.1
TRILLION**

that accounts for some

**1.3
BILLION JOBS**



~200 MHa

In America Latina alone, have been degraded by overgrazing and other unsustainable production practices.



The annual contribution of livestock to climate change, which is about

**8.1 BILLION
tCO₂eq**



These includes emissions from deforestation to make way to pastures

50%

Of total agricultural emissions

15%

of all human-induced greenhouse gas emission



This negative impact is similar in most areas used for feed;
70% of sweet water to agriculture, **22%** to livestock



Conserving the world's largest collections of 3 major crops

Agrobiodiversity is key to maintaining ecosystems and providing adequate supplies of healthy, nutritious food in the face of climate change & environmental degradation.



≈38,000

Bean accessions



≈6,000

Cassava accessions



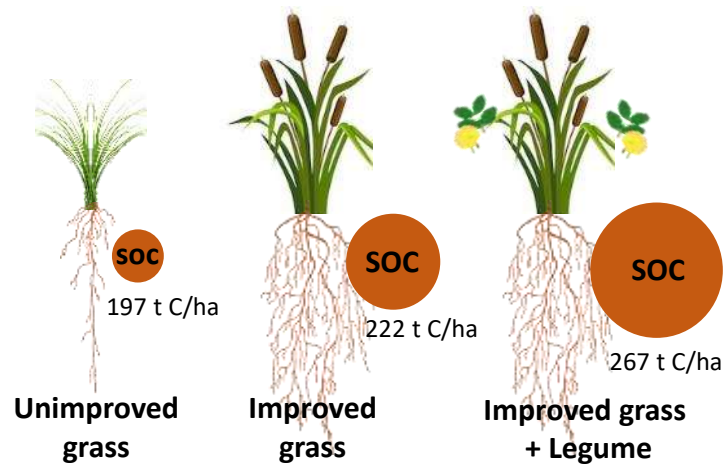
≈22,000

Tropical Forages accessions

Ensuring system sustainability through integrating improved forages in mixed crop-tree-livestock systems in the tropics

Sustainable intensification of (improved) forage-based systems, combining genetic, ecological and socio-economic intensification processes, increases the efficiency, has the potential to improve livelihoods, and yields a range of environmental co-benefits.

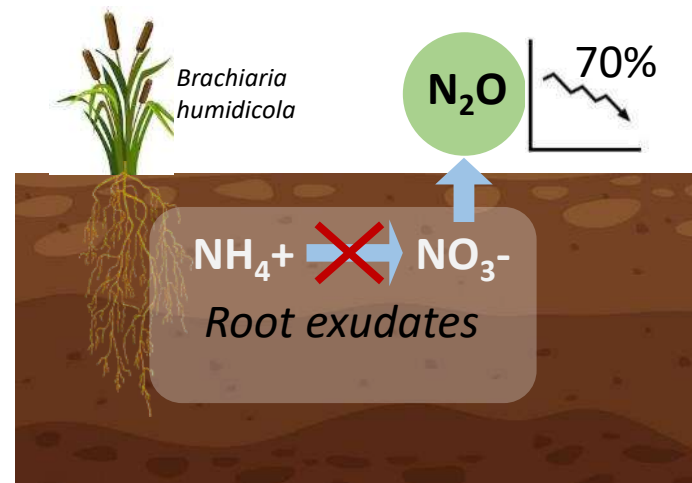
Carbon sequestration



Fisher et al 1994. Letters to Nature

Mitigation of N₂O emissions

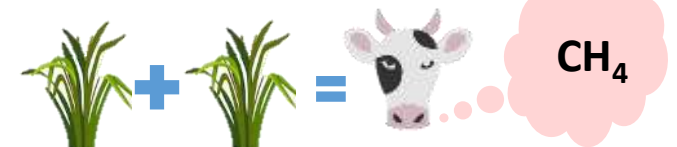
Biological nitrification inhibition (BNI)



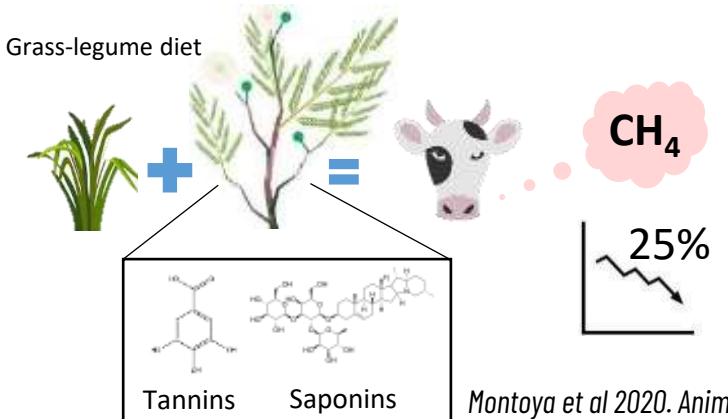
Subbarao et al 2009. PNAS

Mitigation of CH₄ emissions

Grass-alone diet



Grass-legume diet



Montoya et al 2020. Animals

Three examples of our work in Colombia



Market based solutions for sustainable beef production free of deforestation

- GANSO sustainable guarantee, Éxito supermarket



Improving efficiency and reducing emissions in large beef cattle beef operations

- Hacienda San José, Vichada-Colombia



Small to medium livestock producers and peace building

- Rutas PDET Program, Caquetá-Colombia

Sustainability guarantee Market-based solution



Sustainability guarantee

Voluntary assessment tool for livestock enterprises.



Developed in response to a growing demand in the Colombian market for sustainable meat products and zero deforestation



It is framed within the objectives and principles of the Global Roundtable for Sustainable Beef (GRSB)



¿How does it work?

The GANSO guarantee has 5 pillars, which group a set of 52 practices of sustainable cattle production that are verified by an independent evaluating entity



ENVIRONMENT



PEOPLE



ANIMALS



MANAGEMENT



MEAT QUALITY

The GANSO Endorsement allows three levels of progress to be achieved according to the results of the evaluation on the management of sustainability practices and pillars



**Motivated
Level:**
Compliance
less than or
equal to 50%.



Committed Level:
Compliance
between 51% and
79%.



**Responsible
Level:**
Compliance equal
to or greater than
80%

Sustainable livestock products are available in markets



182 stores
6 cities

- Bogotá
- Medellín
- Barranquilla
- Cartagena
- Villavicencio
- Pereira



Improving efficiency and reducing emissions in large beef cattle operations Hacienda San José, Vichada-Colombia



WORLD BANK GROUP

Livestock in the Colombian Orinoco region, large producers

- AFOLU sector in Colombia: 59% of GHG emissions in 2018¹ → 51% come from livestock.
- Livestock could be key in achieving NDCs in the context of the Paris Agreement.



★ Location of the case study.

Matiz-Rubio et al. (in preparation), Climate impact of producing genetic resources for more efficient beef cattle.

- Beef production in Colombia: 11.6 million head.
 - 43% of cattle.
 - 34% in extensive systems in the Orinoquia.

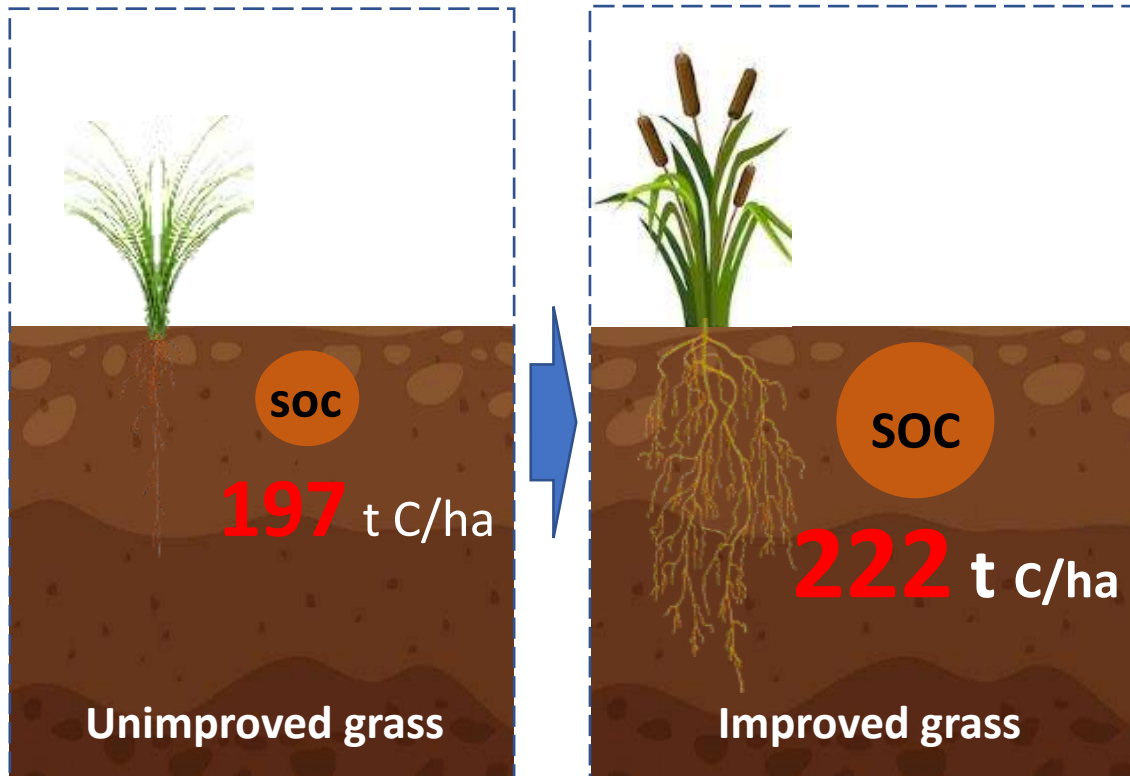
Vichada:

- 10 million ha, 6% of the national territory.
- Annual burning of pastures to provide animals with minerals from the ashes and control unpalatable weeds².
- Degraded pastures.
- Little infrastructure, scarce labor force.

¹IDEAM, UNDP 2018; ²Peñuela et al. 2014;

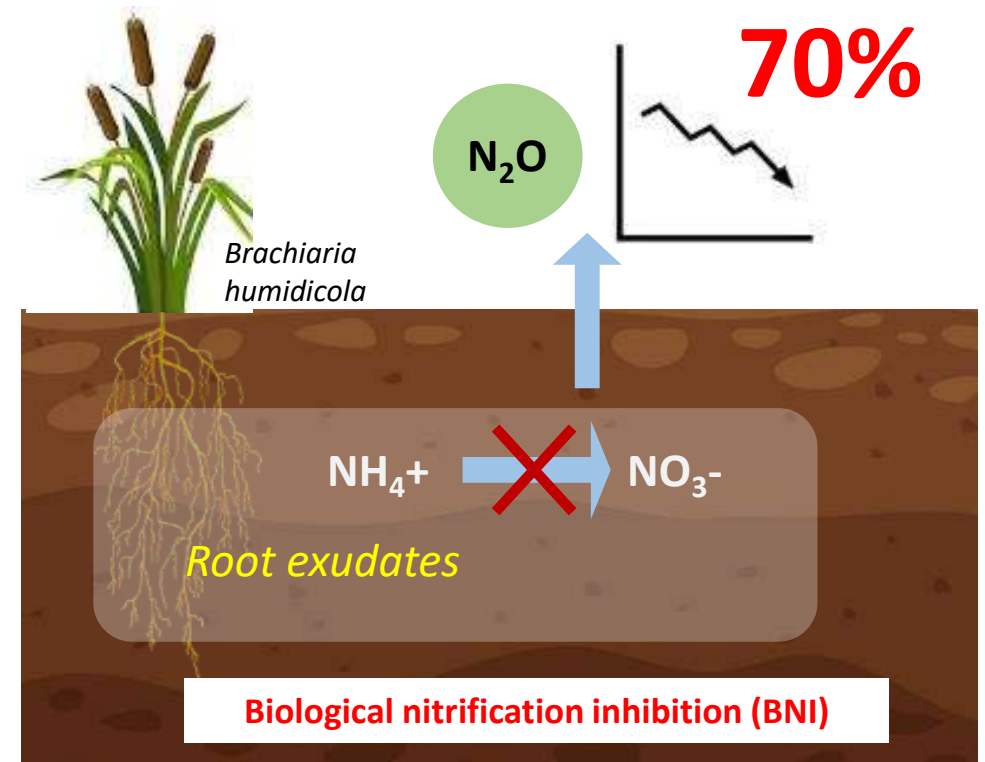
Super Grass adapted for the region with two benefits for Climate Change Mitigation

Carbon removal into soil



Fisher et al. 1994. Letters to Nature

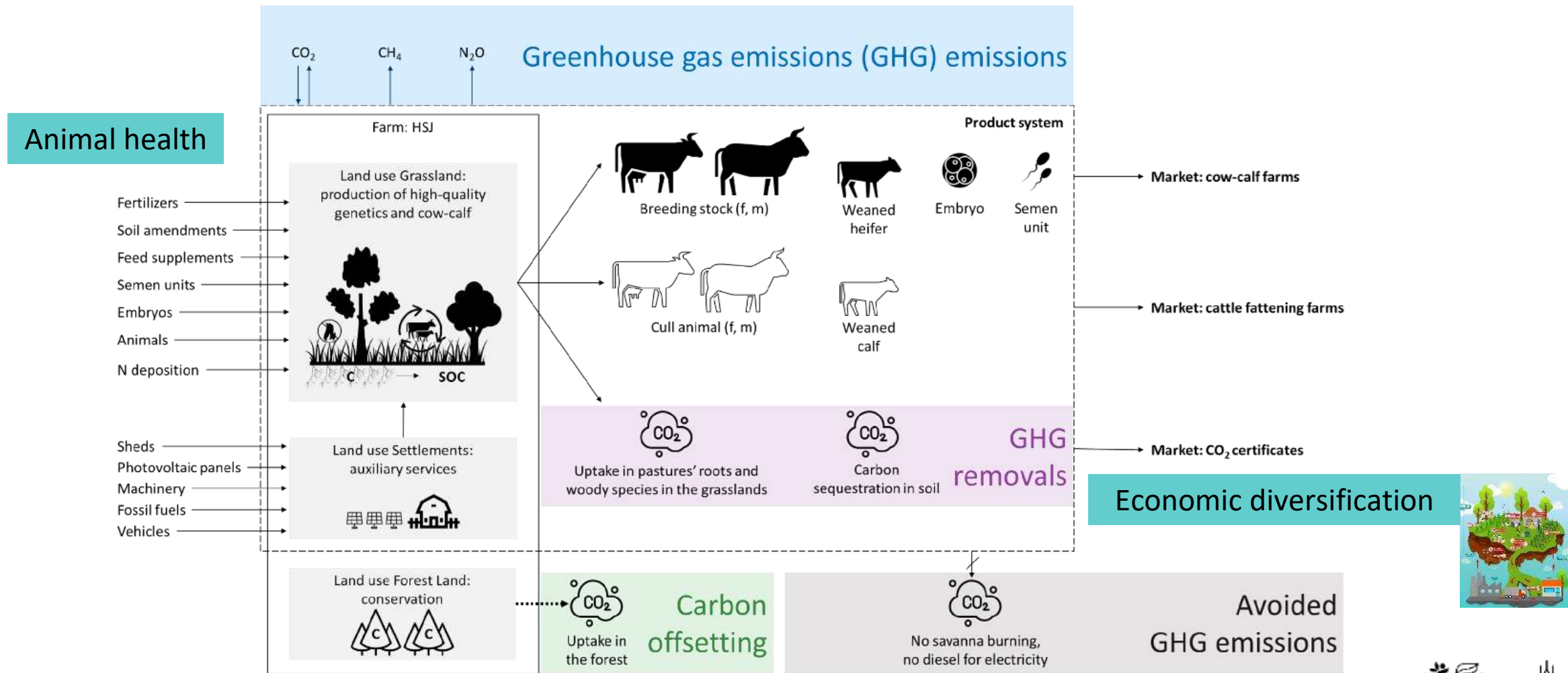
Lower N₂O emissions



Subbarao et al. 2009. PNAS

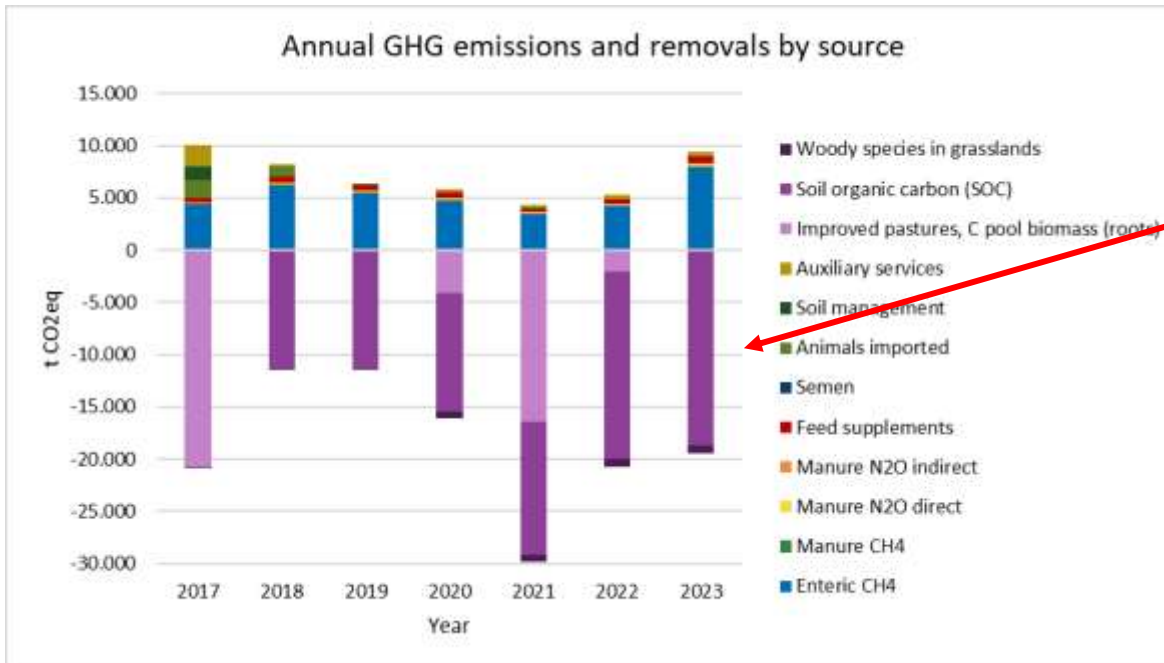
Life cycle assessment of HSJ at the farm level

$$\text{Carbon footprint} = \text{Emissions} - \text{GHG Captures}$$



Negative carbon footprint of a cattle breeding farm

Functional unit: Live weight (LW) produced during 2017–2023: 5,840 t



Carbon-intensity: 8.4 kg CO₂eq kg⁻¹ LW

- ✓ 46% lower than breeding farms in the region.

Soil carbon sequestration potential: 2.5 t CO₂ ha⁻¹ y⁻¹

- ✓ Deep root systems and high root turnover for 20 years with improved grazing of pasture *U. humidicola* CIAT 679

Negative carbon footprint: -17.0 kg CO₂eq kg⁻¹ LW

- ✓ Carbon sequestration is higher than GHG emissions.
- ✓ Opportunity to access C markets and expand to 180k ha

Additional avoided emissions: 0.4 t CO₂eq ha⁻¹ y⁻¹

- ✓ No savanna burning



Research paper:

<https://doi.org/10.3389/fclim.2022.916068>

Report:

<https://hdl.handle.net/10568/121105>

Livestock as key driver of peace



Financiado por:



UNIÓN EUROPEA



Rutas PDET Program

Implementado por:

Red Adelco
Red Nacional de Agentes de Desarrollo Local de Guandá
#SomosOFI territorio

Alianza
Biodiversity & CIAT

CONEXIÓN
CONEXIÓN

Apoyado por:



GOBIERNO DE COLOMBIA

pdet
Programa de Desarrollo Territorial

4-year program financed by the European Union through the European Fund for Peace, led by the National Government with the purpose of consolidating cocoa and dairy value chains in the departments of Putumayo, Caquetá and Nariño (Tumaco).



S04. Livestock component



**370 UPA Co-designed
and implemented**
540 producers trained



30% UPA, with women
increasing their active
participation in technology
implementation



**560 ha under sustainable
livestock practices**
Improved forages and
silvopastoral systems



**15% increase in milk
production**
en Liters/cow/day



7 UPA
Demonstrative farms

S05. Conservation



**950 ha of forest
protected**

At least 80% of beneficiaries will
sign voluntary conservation
agreements

Location



Caquetá, Amazon region of Colombia.

4 municipalities:

- **San Vicente del Caguán**
- **La Montañita**
- **Puerto Rico**
- **El Paujil**

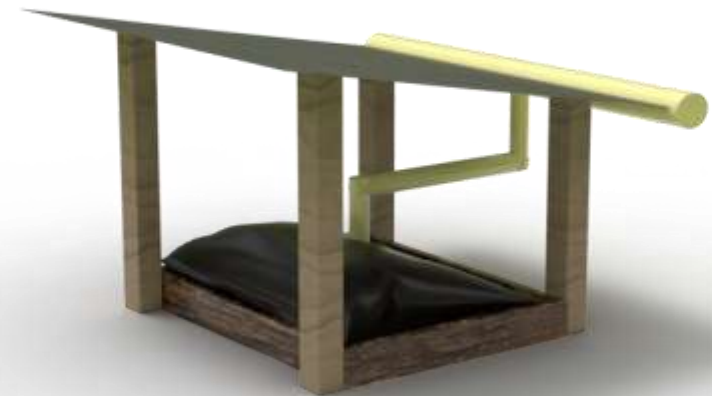
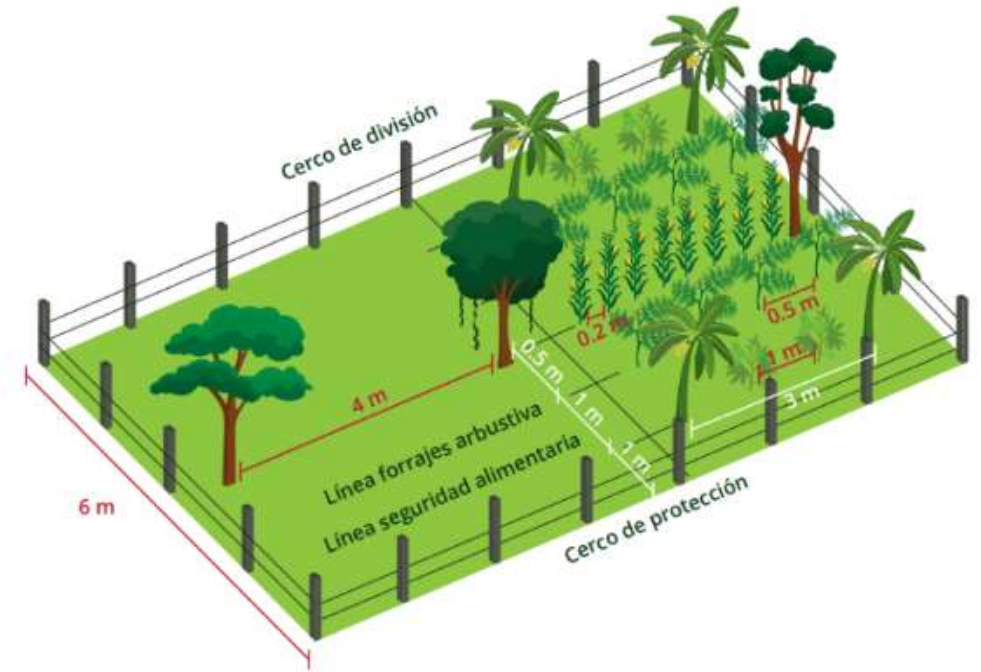


Sustainable practices

- Water harvesting + Livestock Aqueduct
- Paddock division + Tree strips
- Grassland renovation + Soil fertility
- Food security
- Mixed fodder banks
- Forests conservation

Silvopastoral Systems, working with communities in the Department of Caquetá

<https://hdl.handle.net/10568/120231>





Thanks!



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