Comprehensive analysis of intensive silvopastoral systems (ISPS) in Colombia (case studies)

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agri benchmark

Cali, Colombia
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Assessment conducted by four institutions

***agri benchmark* Network**

Thünen Institute of Farm Economics

CIPAV Centre for Research on Sustainable Agricultural Production Systems

FEDEGAN

Colombian Cattle Ranching Farmers Association
Economic studies Unit

World Animal Protection

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1. Developing the assessment
2. Methodological approach
3. Preliminary results
4. Conclusions and next steps

1. Developing the assessment

agri benchmark and FEDEGAN evaluated farms with the ISPS component (2010)

- A more complex approach was needed

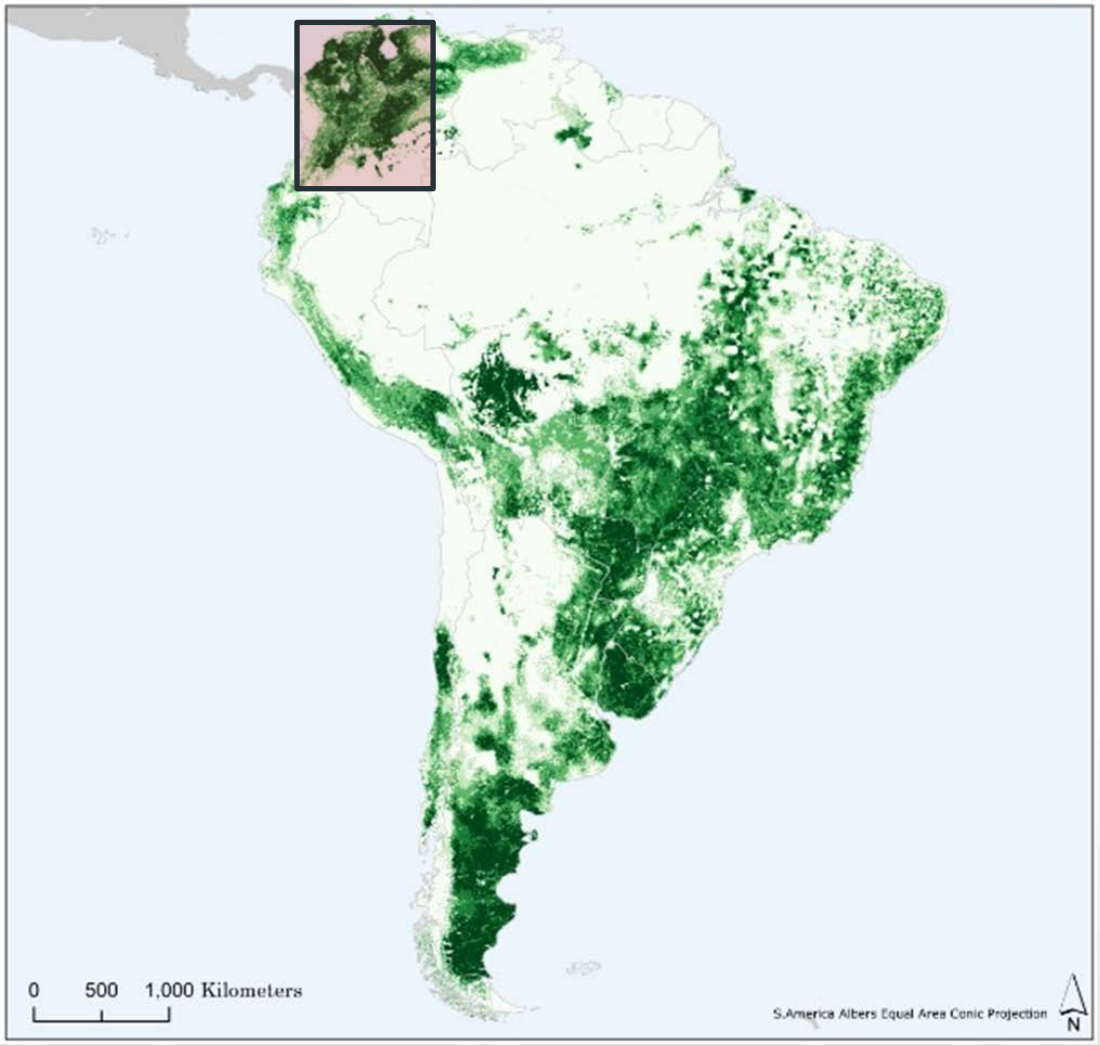
The ISPS project was exploring for a monitoring system for evaluating results (2012-2013)

- *agri benchmark,* CIPAV, FEDEGAN and World Animal Protection explored possibilitites to provide assessment

3 case studies selected, adopting intensive ISPS (2013-14)

- 2 regions
- 3 Prod. Systems
  - Beef finishing
  - Dual purpose
  - Tropical dairy

1. Developing the assessment – Describing the regions



- 550 million hectares in Latin America (2007)
  27% of area
- 38 million hectares in Colombia

1. Developing the assessment – Describing the regions

	La Luisa Beef finishing	Petequi Dual purpose	Hatico Tropical dairy
Region	Codazzi, Cesar	Jamundí, Valle	Cerrito, Valle
Regional annual precipitation (mm)	960	1.500	1.500
Main regional crops	Palm oil - Cotton	Sugar cane	Sugar cane
Main regional livestock production Systems	Cow-calf Beef finishing Dual purpose	Tropical dairy Dual purpose	Tropical dairy

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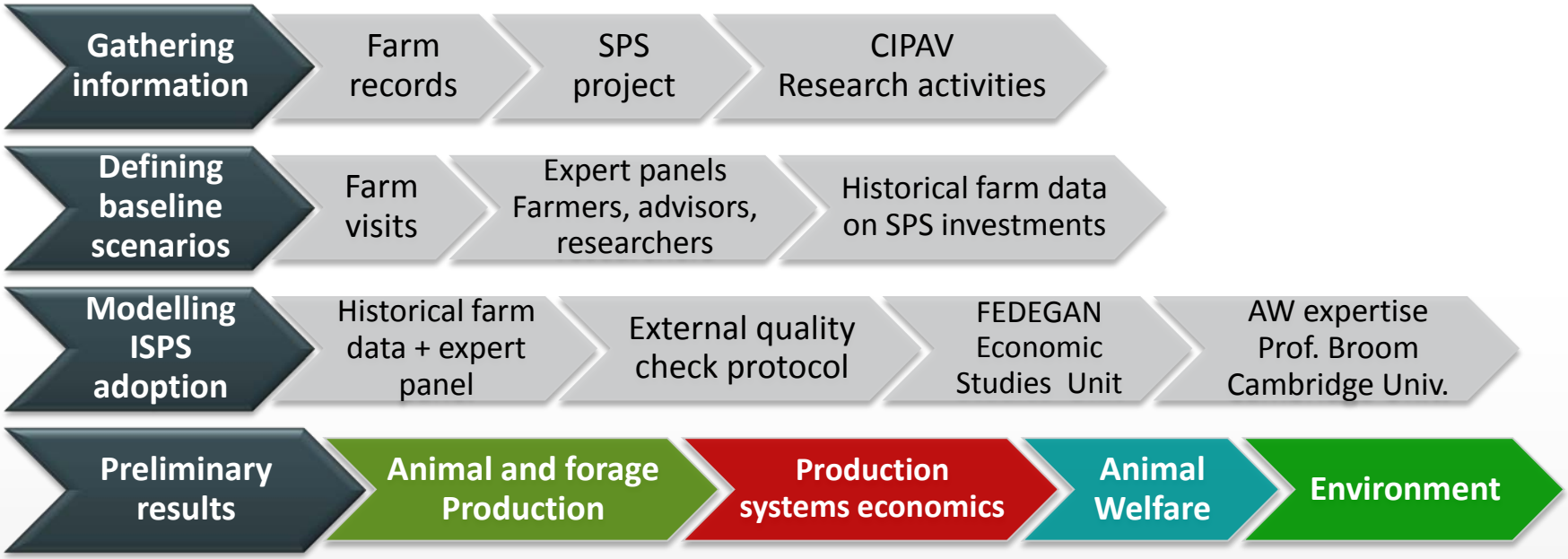
1. Developing the assesment

2. **Methodological approach**

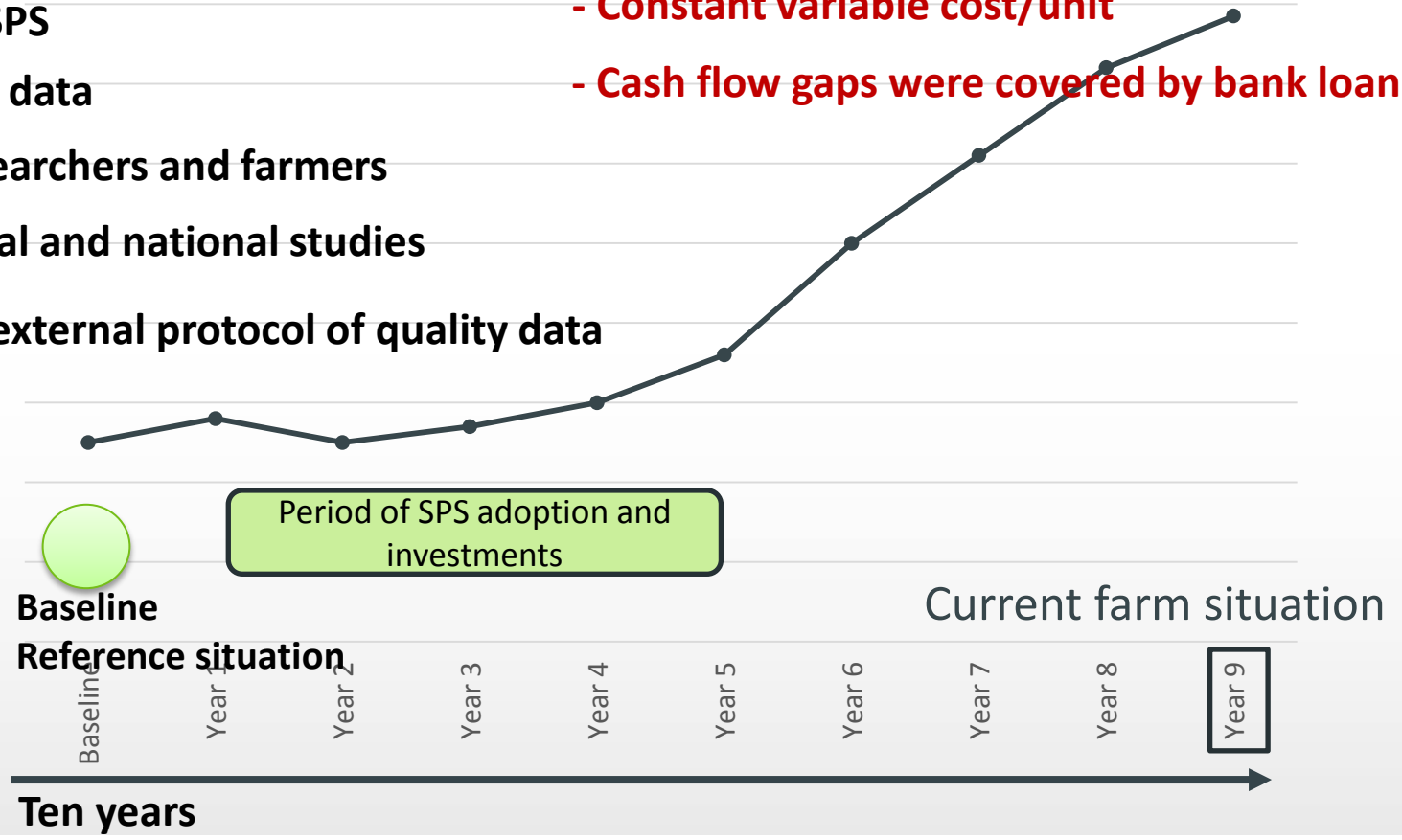
2. Methodological approach



2. Methodological approach

1. We have been modeling ISPS
2. Using historical + research data
3. Validated by advisors, researchers and farmers
4. Crosschecking with regional and national studies
5. Results are verified by an external protocol of quality data

- Constant beef price and weaners price
- Constant milk price
- Constant variable cost/unit
- Cash flow gaps were covered by bank loans



2. Methodological approach – Challenges

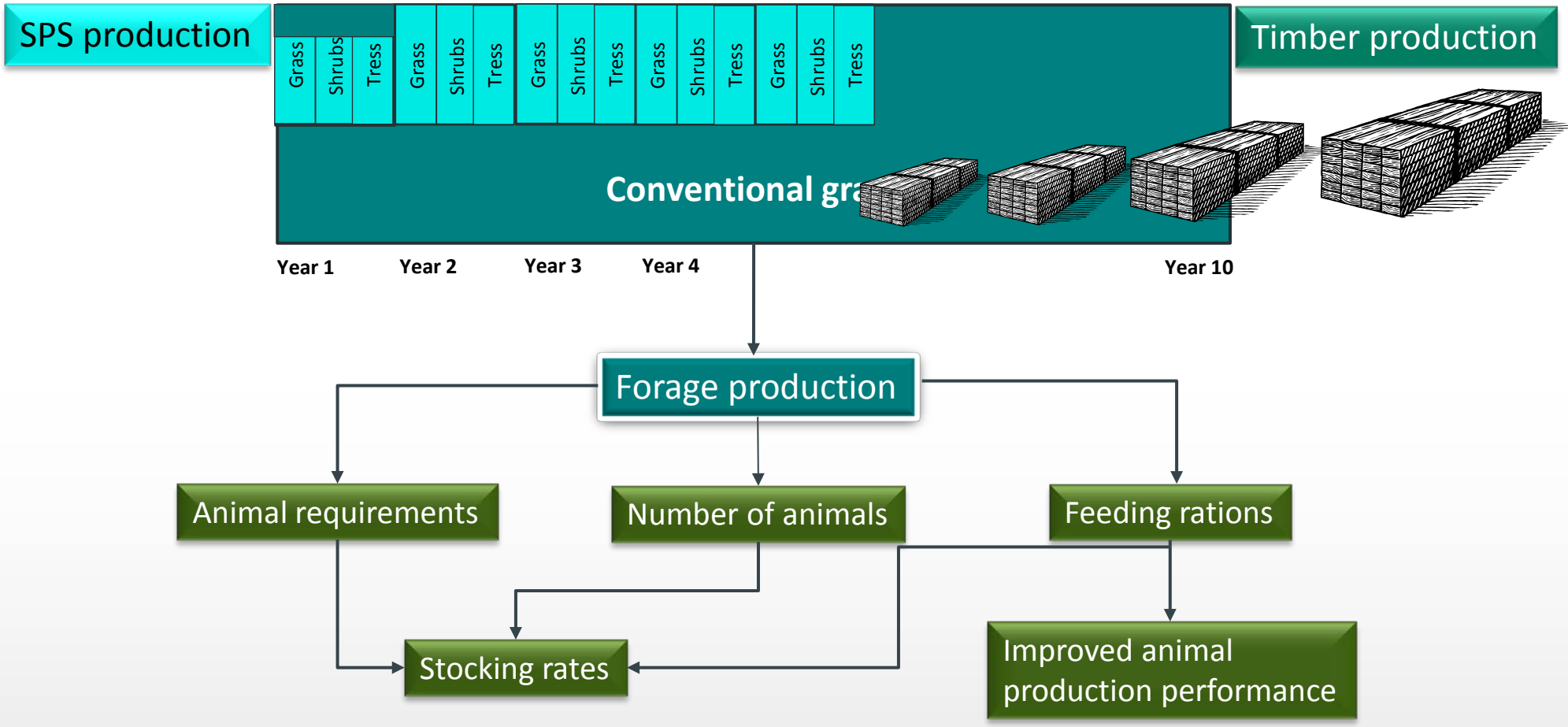
a. Conventional grazing *vs.* SPS grazing

b. Overlapping animal production on conventional and SPS

c. Balancing: feed requirements and rations, # of animals and forage + grass production

d. Agroforestal production (timber)

2. Methodological approach – Challenges



2. Methodological approach - Challenges

3 Land use - p

Conventional grazing (No. Of has.)

SPS adopted (No. Of has.)

Timber planted (No. Of has.)

	2015	2016	2017	2018	2019	2020	2021	2022
Barbecho								
Pastoreo	132	122	112	92	72	52	32	12	0	0
Zonas non-productivas	65	65	65	65	65	65	65	65	57	57
Camino y instalaciones	3	3	3	3	3	3	3	3	3	3
SSP Graminea (Gui		10	20	40	60	80	100	120	140	140
SSP (Leucaena)		10	20	40	60	80	100	120	140	140
SSP Arboles ano 1		10	10	10	10	10	10	10	10	10
SSP Arboles ano 2			10	10	10	10	10	10	10	10
SSP Arboles ano 3				10	10	10	10	10	10	10
SSP Arboles ano 4					10	10	10	10	10	10
SSP Arboles ano 5						10	10	10	10	10
SSP Arboles ano 6							10	10	10	10
SSP Arboles ano 7								10	10	10
SSP Arboles ano 8									10	10

4 Crop Yield in Fresh Matter

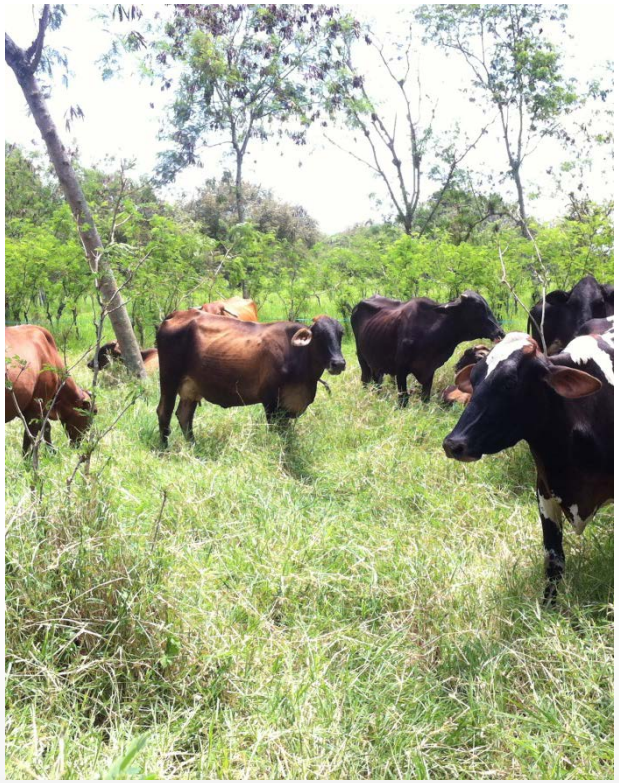
Conventional (tons/ha)

ISPS (tons/ha)

TIMBER (tons/ha)

	2015	2016	2017	2018	2019	2020	2021	2022
Barbecho								
Pastoreo	18,89	18,89	18,89	18,89	18,89	18,89	18,89	18,89		
Zonas non-productivas										
Camino y instalaciones										
SSP Graminea (Guinea)		59,50	59,50	59,50	59,50	59,50	59,50	59,50	59,50	59,50
SSP (Leucaena)		53,20	53,20	53,20	53,20	53,20	53,20	53,20	53,20	53,20
SSP Arboles ano 1						17,70		28,30		
SSP Arboles ano 2							17,70		28,30	
SSP Arboles ano 3								17,70		
SSP Arboles ano 4									17,70	
SSP Arboles ano 5										
SSP Arboles ano 6										
SSP Arboles ano 7										
SSP Arboles ano 8										

2. Methodological approach – animal welfare

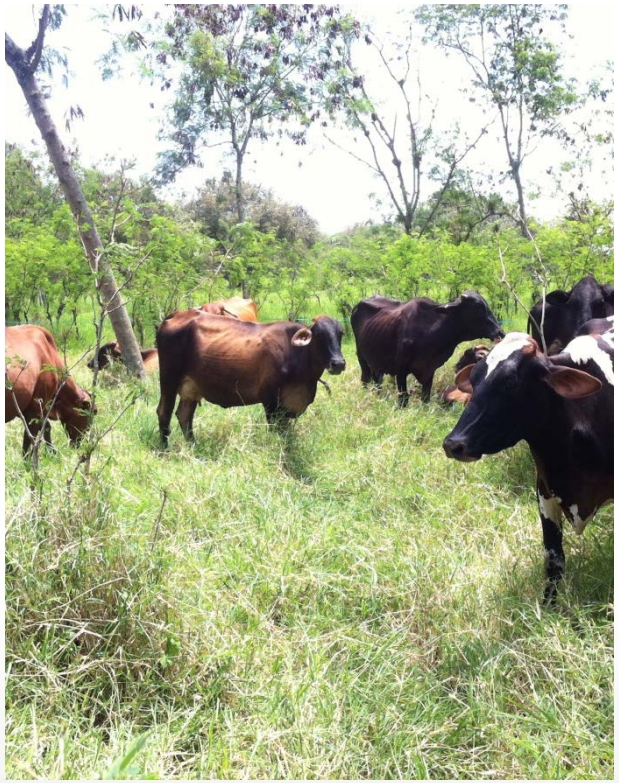


Animal welfare field assessment protocol

Measured welfare potential (resources) + welfare outcomes

- Physical / health and behaviour
- Body condition
- Tick count
- Presence of injury/disease/lameness
- Heat stress
- Water and feed quality and availability
- Natural behaviour (forage, exercise, rest)
- Access to shade at hottest part of day
- Fearfulness / ease of approach (relevant to handling)

2. Methodological approach – animal welfare



Measures from farm records

Record if data collected where appropriate for herd.

- Mortality rate
- Weight change per month per animal
- Milk yield per animal per day
- Use of painful treatments such as castration, tail-docking, de-horning, disbudding, hot-iron branding
- Therapeutic or prophylactic use of antibiotics or other antimicrobials or anti-parasitic drugs
- Mastitis and lameness
- Calving interval and fertility, calving rate

Content

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3. **Preliminary results**

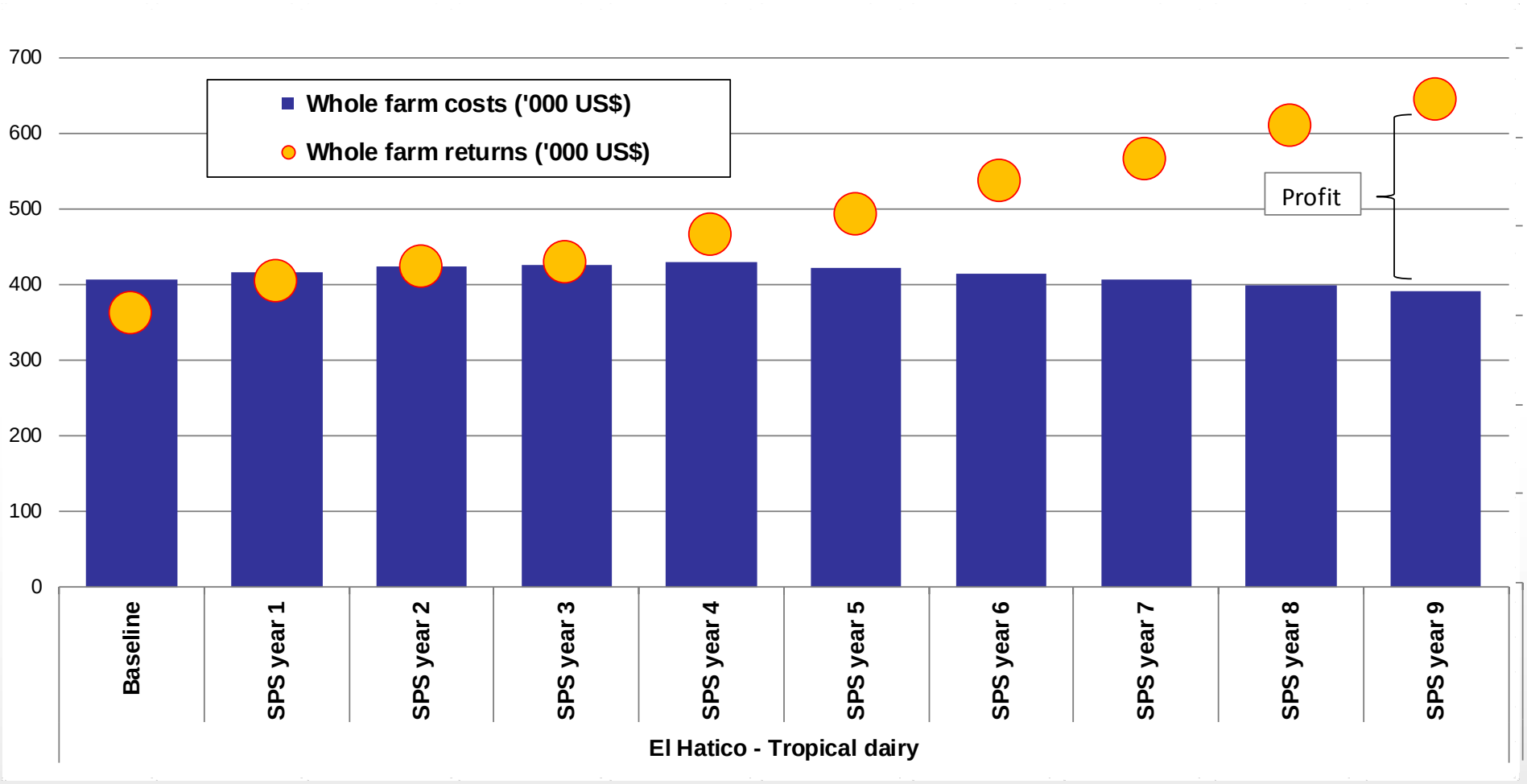
3. Preliminary results – Main changes in farm production

	La Luisa Beef finishing	Petequi Dual purpose	Hatico Tropical dairy
Number of has. on conventional grazing Year 0 - baseline	132	30	135
Number of has. In SPS year 5	80	14	50
Number of has. In SPS year 10	140	14	94
Number of adult animals/year year 0 - baseline	71*	35	230
Number of adult animals year 10	710*	58	307
Yield/animal baseline	from 180 to 450 kg beef in 2,0 years	2.346 kg Milk per cow/year	2.644 kg milk per cow/year
Yield/animal year 10	from 180 to 450 kg beef in 1,2 years	3.084 kg milk per cow/year	3.010 kg milk per cow/year

* Animals sold/year

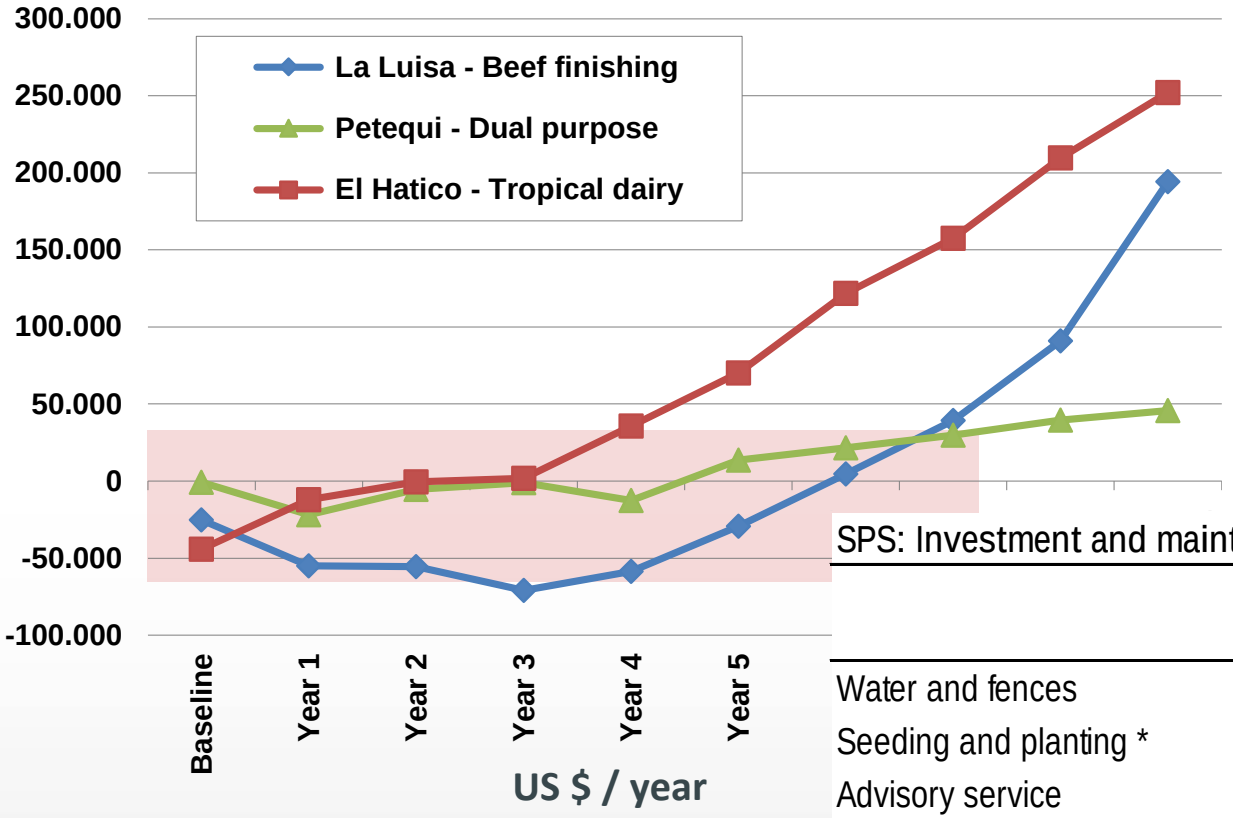
3. Preliminary results – Feed production and land productivity

3. Preliminary results – Cost and profit



Calculations include interest on liabilities and exclude interest on savings

3. Preliminary results – Profit – 10 years



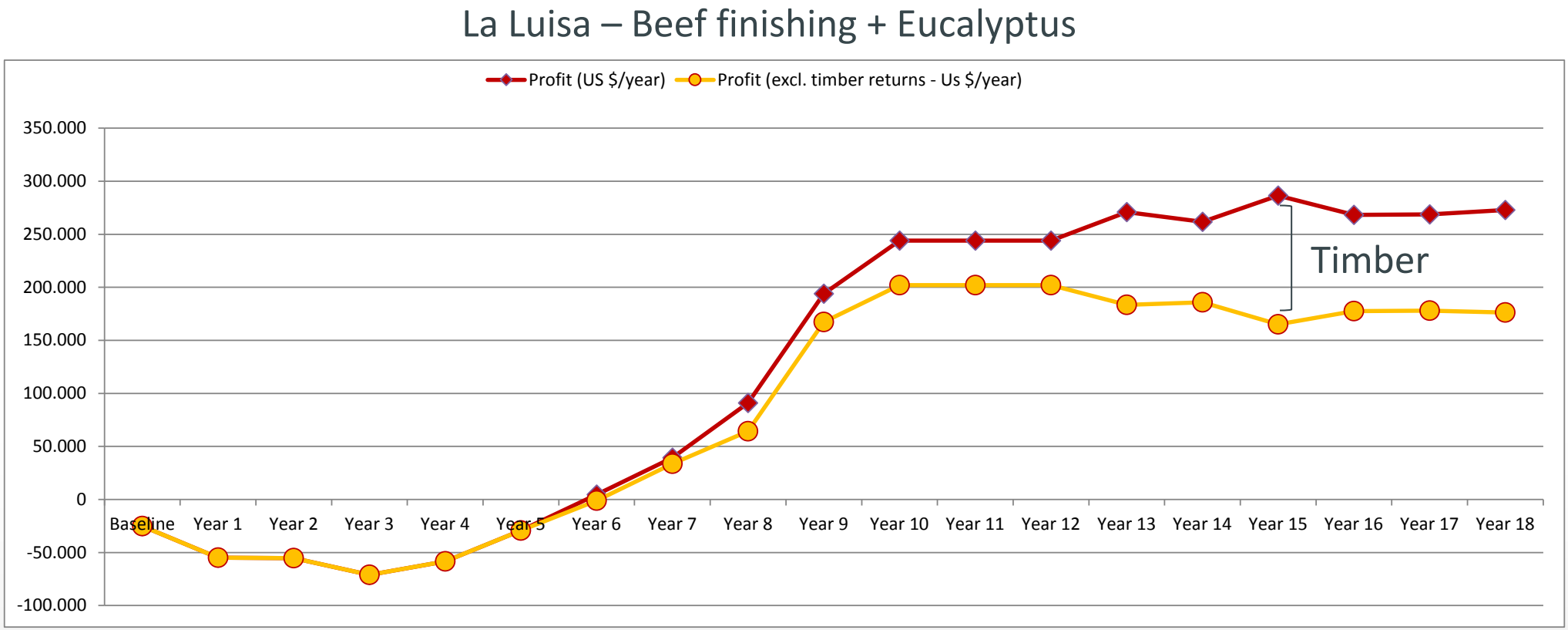
SPS: Investment and maintenance costs per ha (US $ / ha)

	La Luisa Beef F.	Petequi D.Purpose	Hatico T.Dairy
Water and fences	648	648	492
Seeding and planting *	1.713	2.343	2.385
Advisory service	108	108	108
Maintenance	224	89	93
Total	2.692	3.187	3.079

* incl. soil preparation, fertilisation, plant protection, irrigation (Petequi/Hatico)

Calculations include interest on liabilities and exclude interest on savings

3. Preliminary results – Profit + timber production



Calculations include interest on liabilities and exclude interest on savings

3. Preliminary results – Animal welfare

Farm	Feeding	Breed	Environment	Behaviour	Health
El Hatico, Cauca valley	Good quality, green forage eg Leucaena Clean water available ad libitum. Max distance to water: 150m	Breed suited to local environment – Lucerna (an indigenous breed) Animals were selected for short hair, good walking ability, compact size and good lifetime yield.	Good space in paddocks Trees and shrubs - shade for all animals at all times of the day Dry, comfortable areas for lying	Freedom of movement Could exhibit natural behaviour: grazing, walking, lying, ruminating, positively interact with other animals Animals could choose their environment Animals were calm,, no fearful response. Flight zone: 0-2 metres	Bright, alert and responsive Body condition ranged from 3-4 (average 3.5) Healthy and not lame No signs of heat stress 80% had small population of ticks
Petequi, Cauca valley	Good quality, green forage eg Leucaena Clean water available ad libitum. Max distance to water: 150m	Animals suited to the local environment – dairy cross breed Some Holstein genetics less suited to the high temperature I I	Good space in paddocks Trees and shrubs provided sufficient shade for all animals at all times of the day Dry, comfortable areas for lying	Freedom of movement Could exhibit natural behaviour: grazing, walking, lying, ruminating, positively interact with other animals Animals could choose their environment Animals were calm,, no fearful response Flight zone: 0-3 metres	Bright, alert and responsive Body condition 3-4 (average 3.5) Healthy and not lame Small no. animals with slight signs of heat stress at hottest time of the day 50% had moderate tick infestation.
La Luisa, Cesar Valley	Good quality, green forage eg Leucaena Clean water available ad libitum. Max distance to water: 250m	Animals were suited to the local environment – beef cattle cross	Good space in paddocks Trees, shrubs provided sufficient shade for all animals at all times of the day. Dry, comfortable areas for lying	Freedom of movement Could exhibit natural behaviour Positive interactions with other animals Opportunity to choose natural environment Calm, no fearful response. Flight zone: 0-2 metres	Bright, alert and responsive Body condition 3-4 (average 3.5) Healthy and not lame No signs of heat stress V low presence of flies, ticks
Control farm, Cesar valley	Medium quality forage to meet most but not all nutritional needs Water ad libitum but not clean or fresh	Animals suited to local environment	Good space in paddock Few trees or other shade provision Dry, comfortable lying areas.	Freedom of movement and could exhibit natural behaviour including grazing, walking, lying, ruminating, positively interact with other animals Limited opportunity to choose natural environment (i.e. shade) Fearful – flight zone 8 metres	Bright, alert and responsive Body condition 2-2.5 (average 2.5) Very low presence of flies.

3. Preliminary results – Environmental

a. CO_2 Emissions are being calculated (Enteric fermentation, manure and feed). Preliminary results under revision (applying regional coeficients).

b. Carbon sequestration not yet reflected on the study. Carbon seq. Scenarios will be applied.

c. Water use (animal requirements) is being calculated. Preliminar results under revision

d. Soil quality (organic matter)

e. Biodiversity

Organic Matter in Soil (T C Ha-^{1})

iSPS	Control
127	110

Bio-diversity

	iSPS	IP
Bird richness	45	28
Dung Beetle	8	5
Ant richness	123	55

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4. Preliminary conclusions

1. Results provide evidence for the ability of SPS to create 'triple-win' solutions:
   (a) Productivity and profitability gains (b) Environmental improvement © Animal welfare benefits
2. The overall uptake of SPS has been limited by the level of investments, access to capital, and investment risk.
3. As intensive SPS are management-intensive, capacity building (advisory services) is a key component of successful delivery.
4. Targeted investment early in establishment of SPS, and an effective capacity building program, can provide increased potential for success.
5. The benefits from such investment are clear and this is an area where international and local policy mechanisms, donors and governments can play a crucial role

4. Next steps

1. In order to better define critical periods and main cash flow needs, a detailed analysis of level of investment is required, as well as for risk evaluation.

2. At local level, will be necessary to increase coverage of case studies (SPS Colombian project), where regional and production system differences and farmers reactions, can be measured and illustrated when adopting SPS.

3. It will be also essential to analyze the impact of financial and incentive measures, when adopting SPS (e.g. SPS Colombian projects).

4. At regional level (L. America), would also be important to increase coverage of analysis in order to compare other approaches of SPS (e.g. timber + livestock).

Thanks...

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Harold Niño – Advisor La Luisa
Leonardo Manzano – Advisor La Luisa
Molina's family – El Hatico
Lola Izquierdo – agri benchmark

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Pictures have been taking during the field visits/CIPAV's file