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

Evaluación integral de los sistemas de producción silvopastoriles (SPS)

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agri benchmark

Modeling & evaluating SPS

Valledupar, Colombia
17.06.2015

Contenido

1. Developing the assesment of the silvopastoral systems

2. Preliminary results

3. Next steps

Content

1. Developing the assesment of the silvopastoral systems

Assessment conducted by four institutions
(trabajo desarrollado por 4 instituciones)

***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

Developing the assessment – Describing the regions (regiones donde se desarrolló el trabajo)

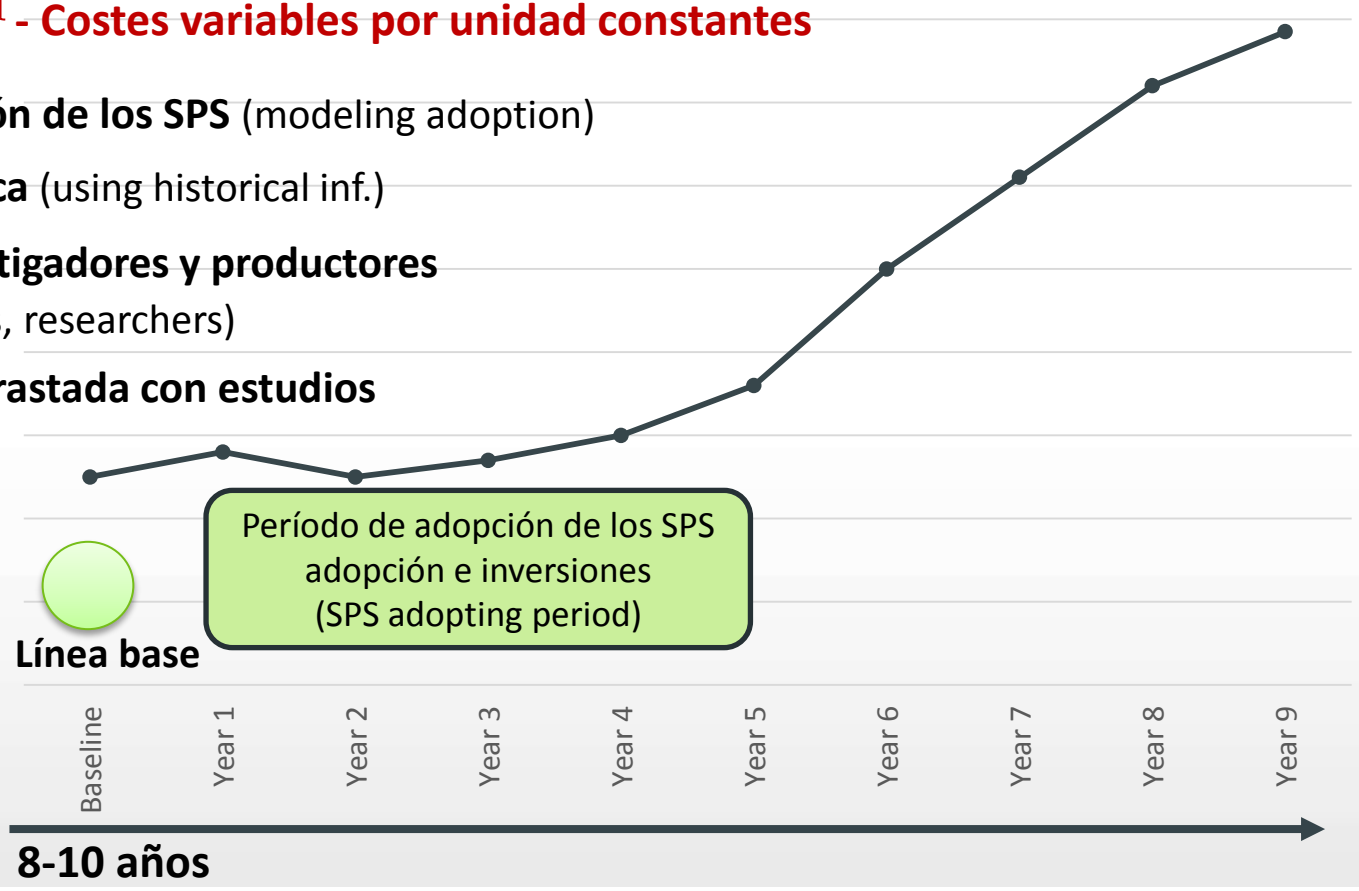
	La Luisa Beef finishing	Petequi Dual purpose	Hatico Tropical dairy
Region	Codazzi, Cesar	Jamundí, Valle	Cerrito, Valle
Regional annual precipitation (mm)	960	1.500	1.500
Main regional crops	Palm oil - Cotton	Sugar cane	Sugar cane
Main regional livestock production Systems	Cow-calf Beef finishing Dual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

Methdological approach– aproximación metodológica

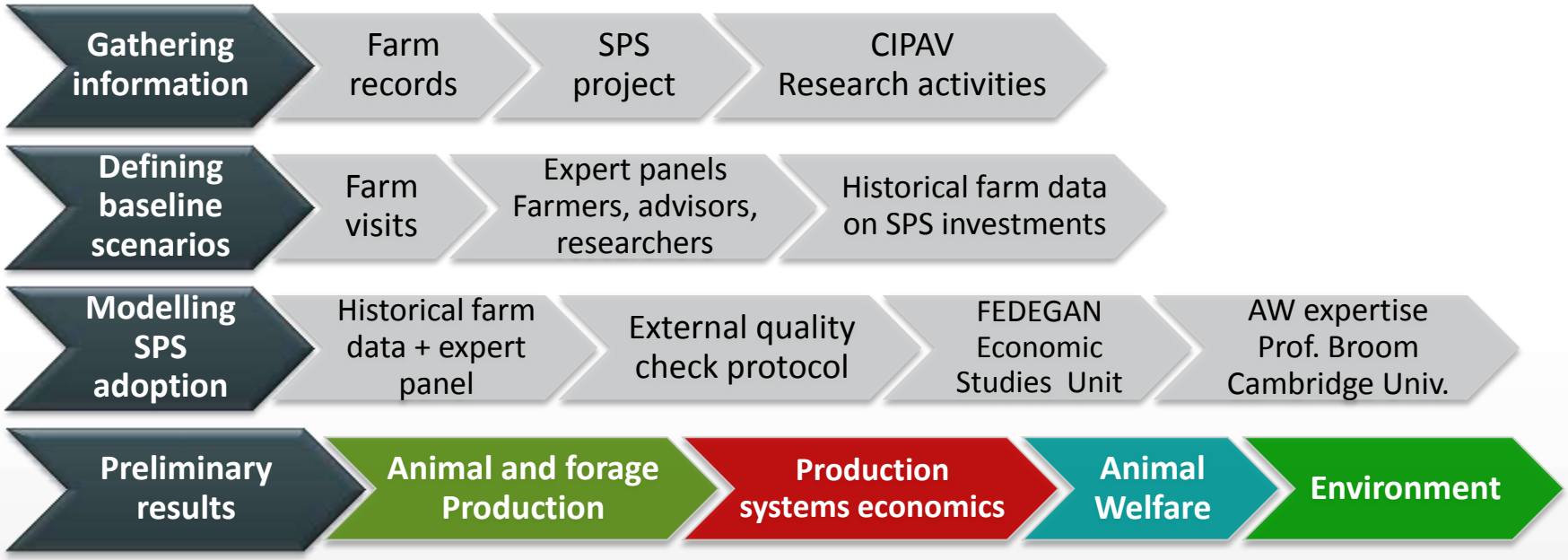
Input/output constant prices

- **Precios de la carne y los terneros constantes**
- **Precio de la leche constante**
- **Costes variables por unidad constantes**

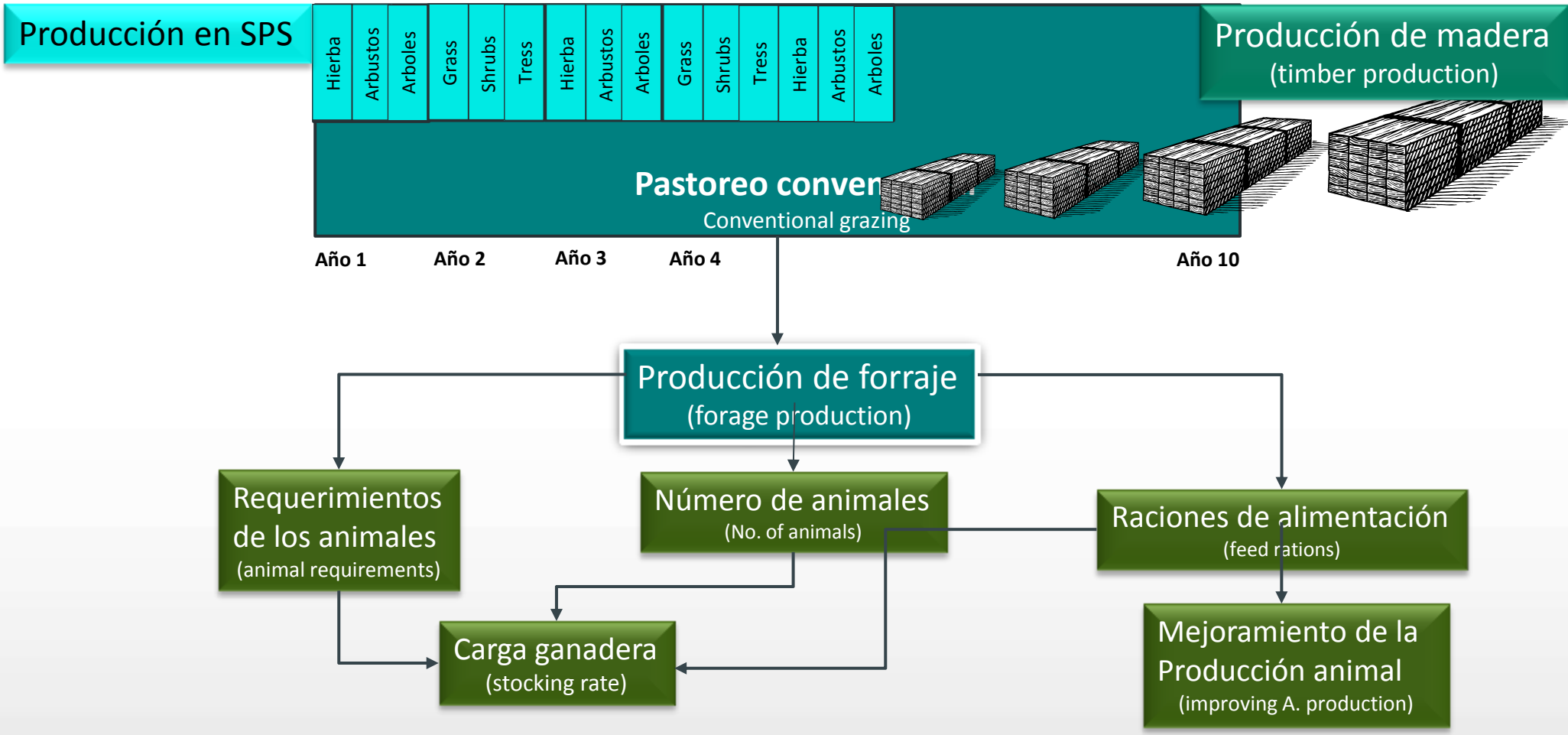
1. **Hemos modelado la adopción de los SPS** (modeling adoption)
2. **Usando información histórica** (using historical inf.)
3. **Validada por técnicos, investigadores y productores** (validated by advisors, farmers, researchers)
4. **La información ha sido contrastada con estudios regionales y nacionales** (inf. Contrasted with national & regional studies)



Methodological approach



Methodological challenges – Retos metodológicos



Aproximación metodológica – Retos (method. Challenges)

3 Land use - p

Convetional grazing (No. de 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		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										

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)

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

Contenido

1. Developing the assesment of the silvopastoral systems

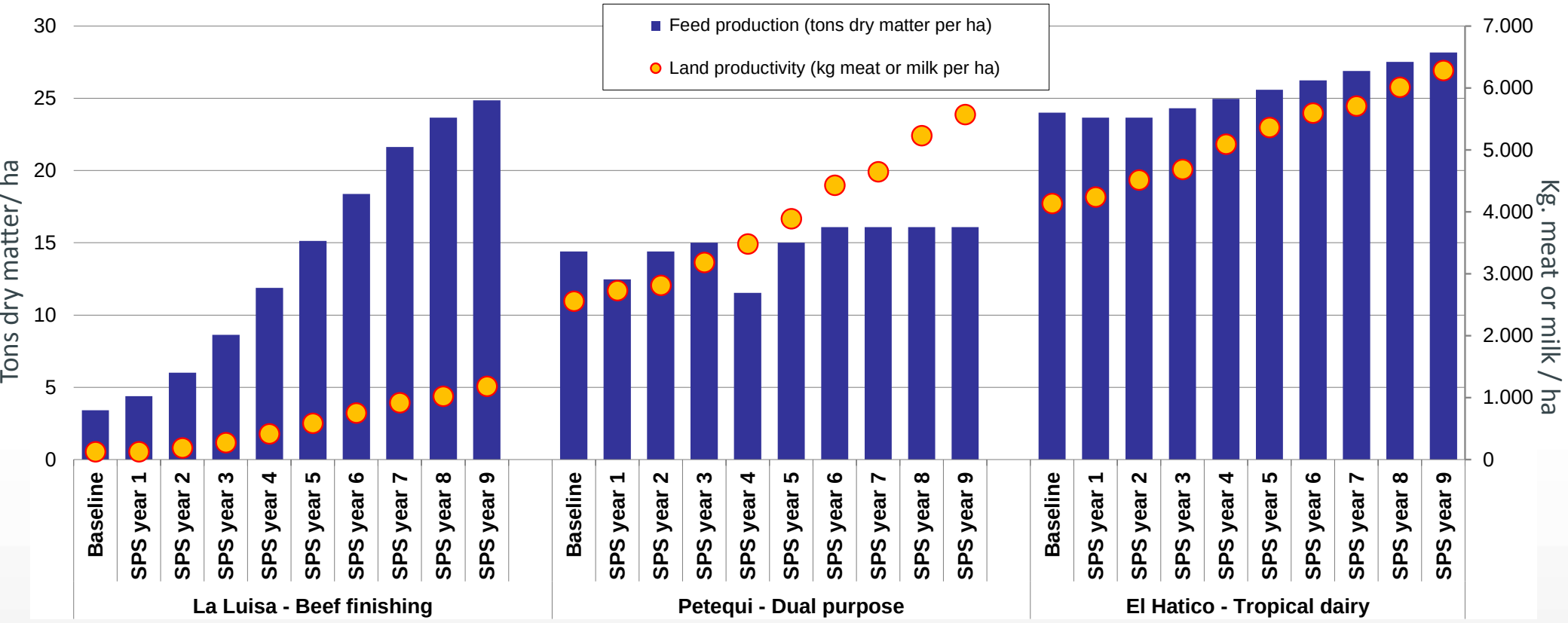
2. **Preliminary results**

3. Preliminary results – Main changes in farm production (cambios principales en la producción)

	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

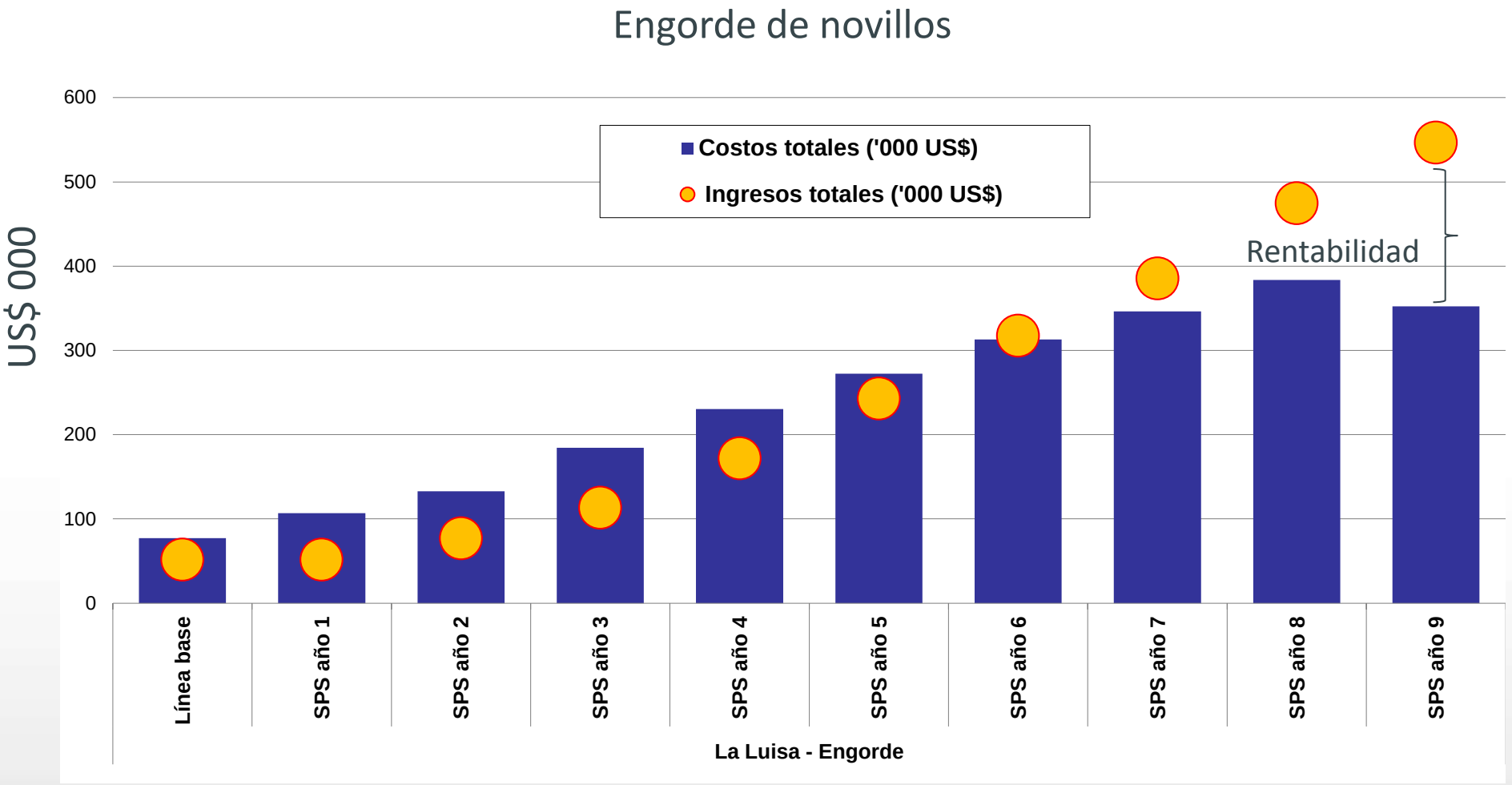
* Animals sold/year

Preliminary results: Feed production and land productivity
Producción de forraje y productividad de la tierra





Resultados preliminares – Ingresos, costos y rentabilidad (costs and profit)



Cálculos incluyen intereses sobre créditos y excluyen intereses en ahorros

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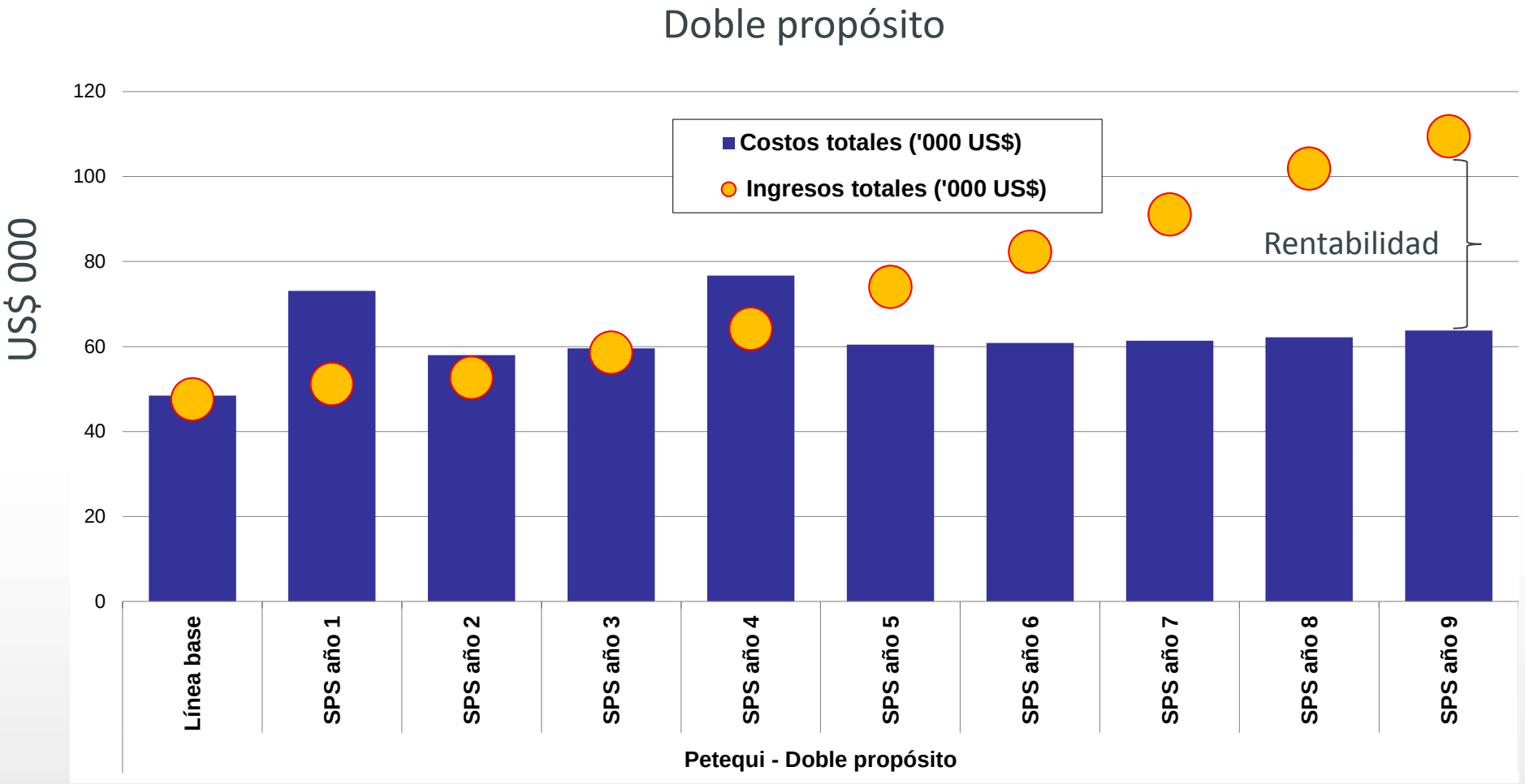

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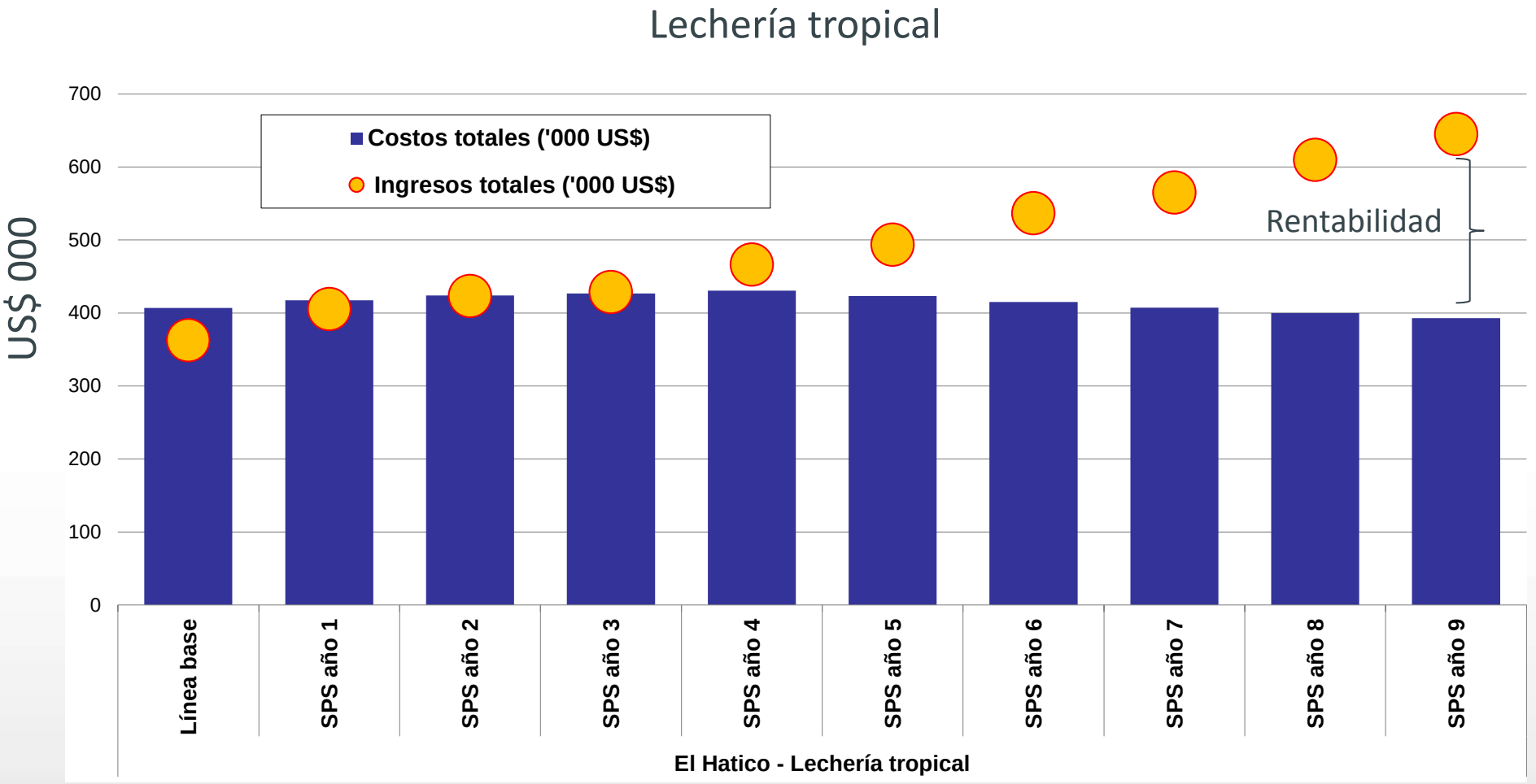

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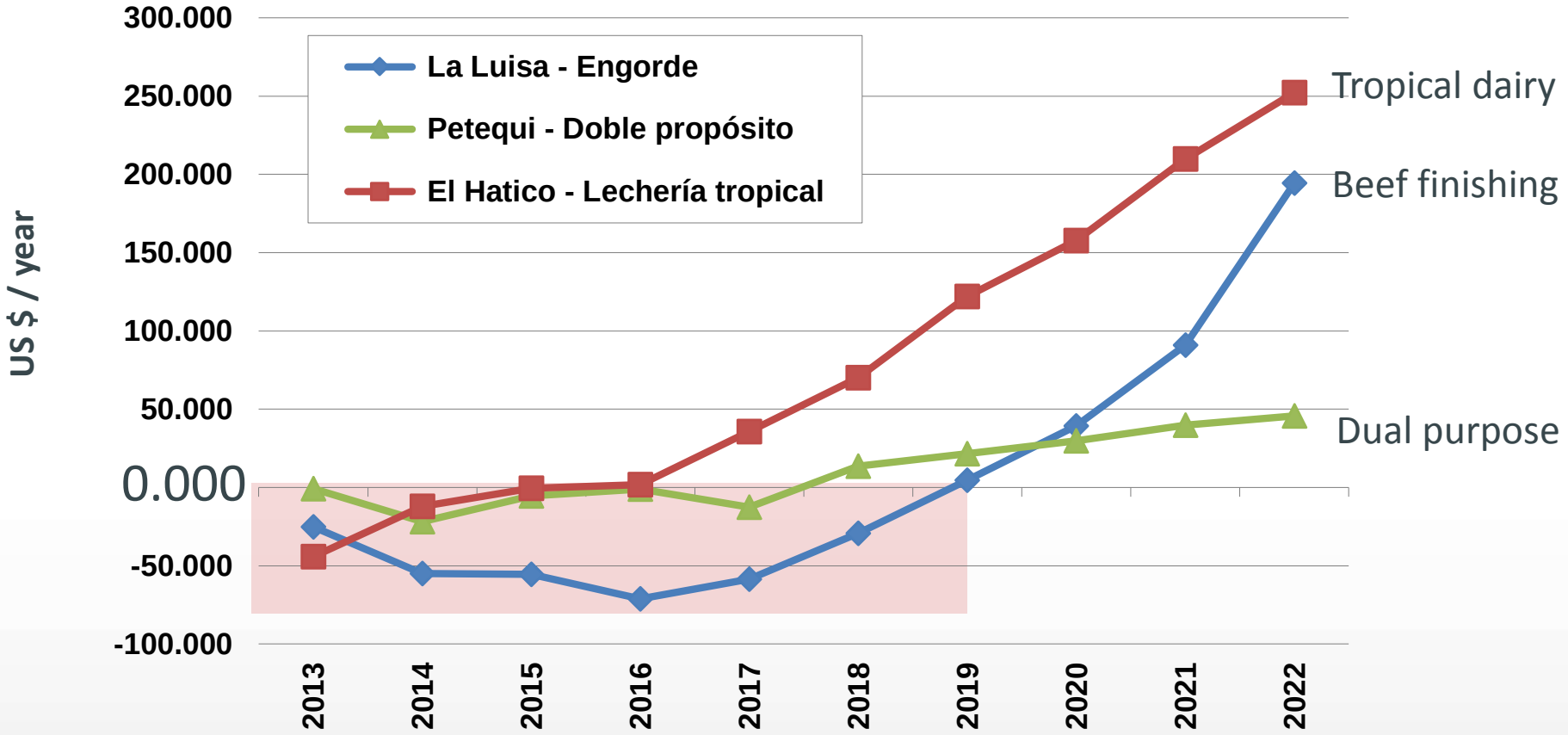
Resultados preliminares – Rentabilidad – 10 años (profit for 10 years)



Calculations include interest on liabilities and exclude interest on savings

Resultados preliminares – Inversiones (Investments)

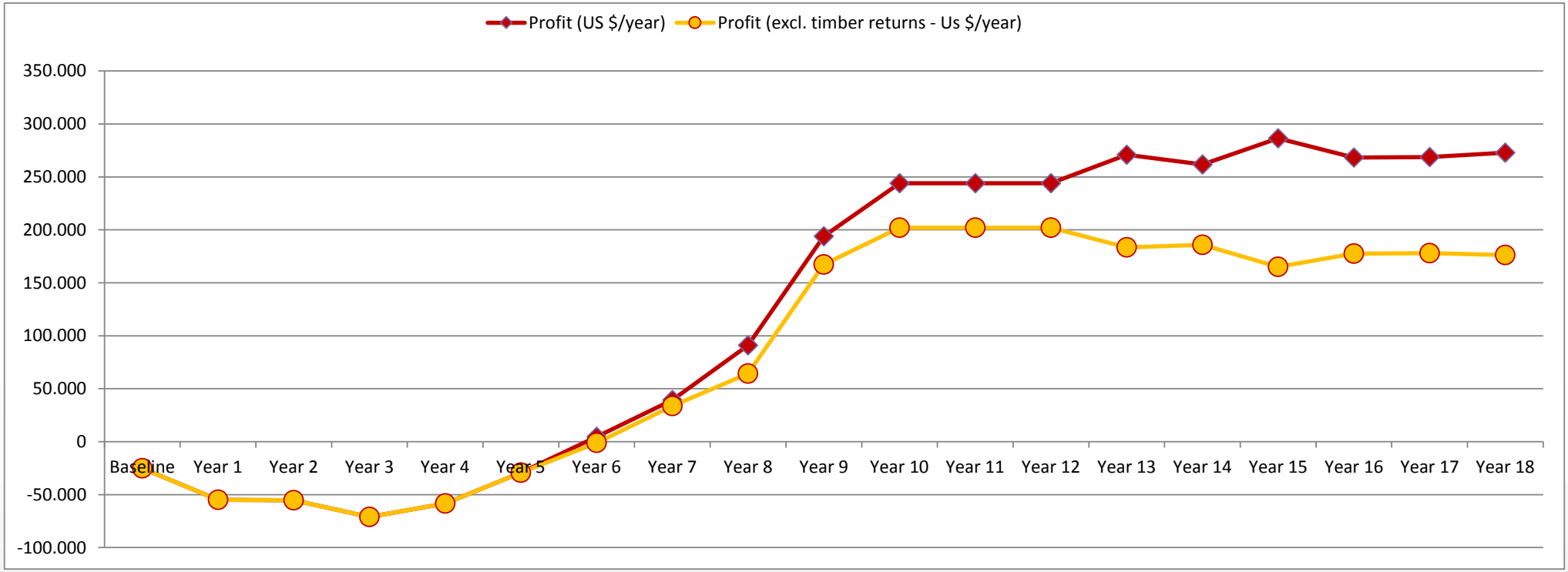
SPS: Investment and maintenance costs per ha (US $ / ha)

	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

Resultados preliminares - Rentabilidad + prod. madera (Profit + timber)

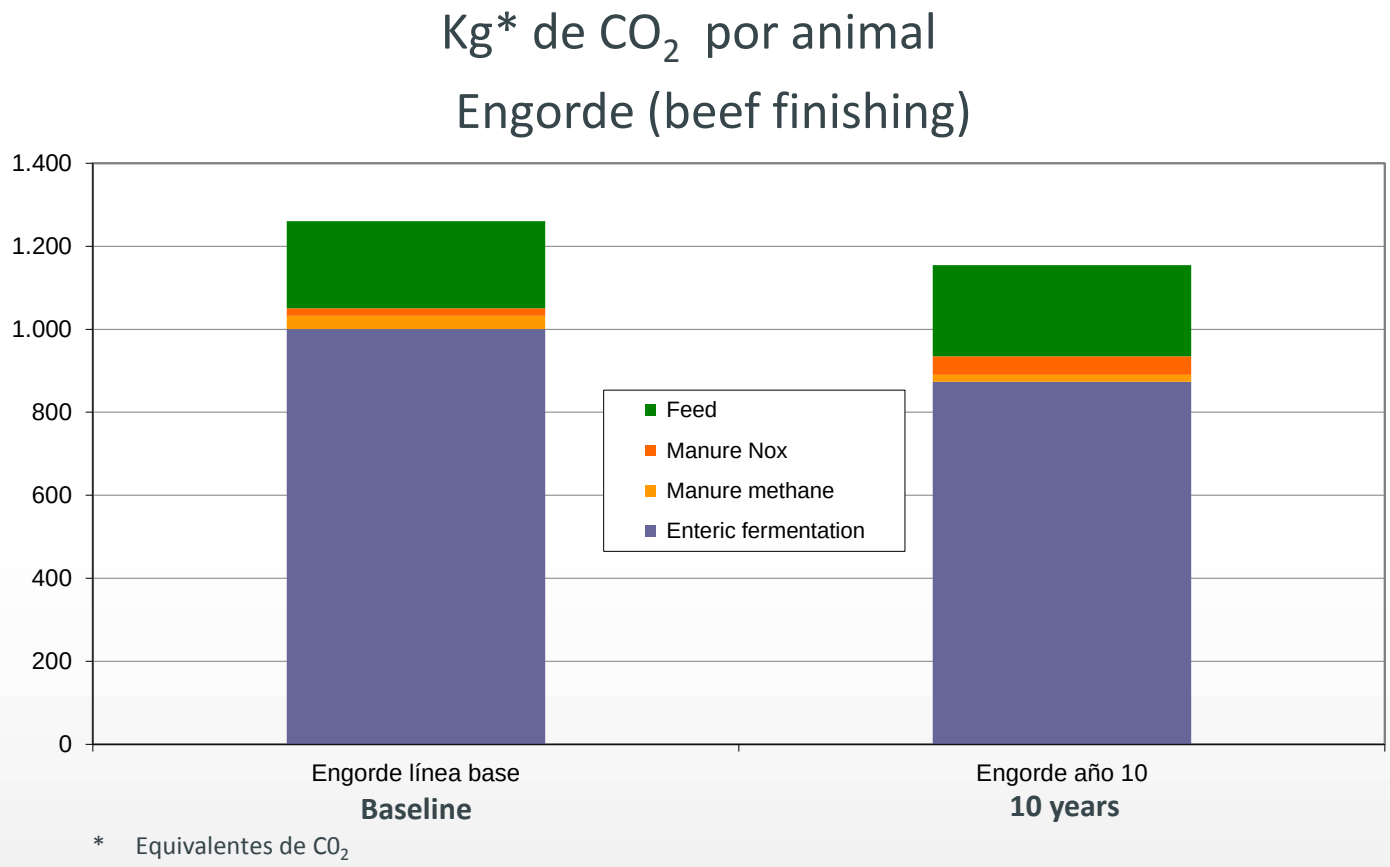


Calculations include interest on liabilities and exclude interest on savings

Resultados preliminares – Bienestar animal

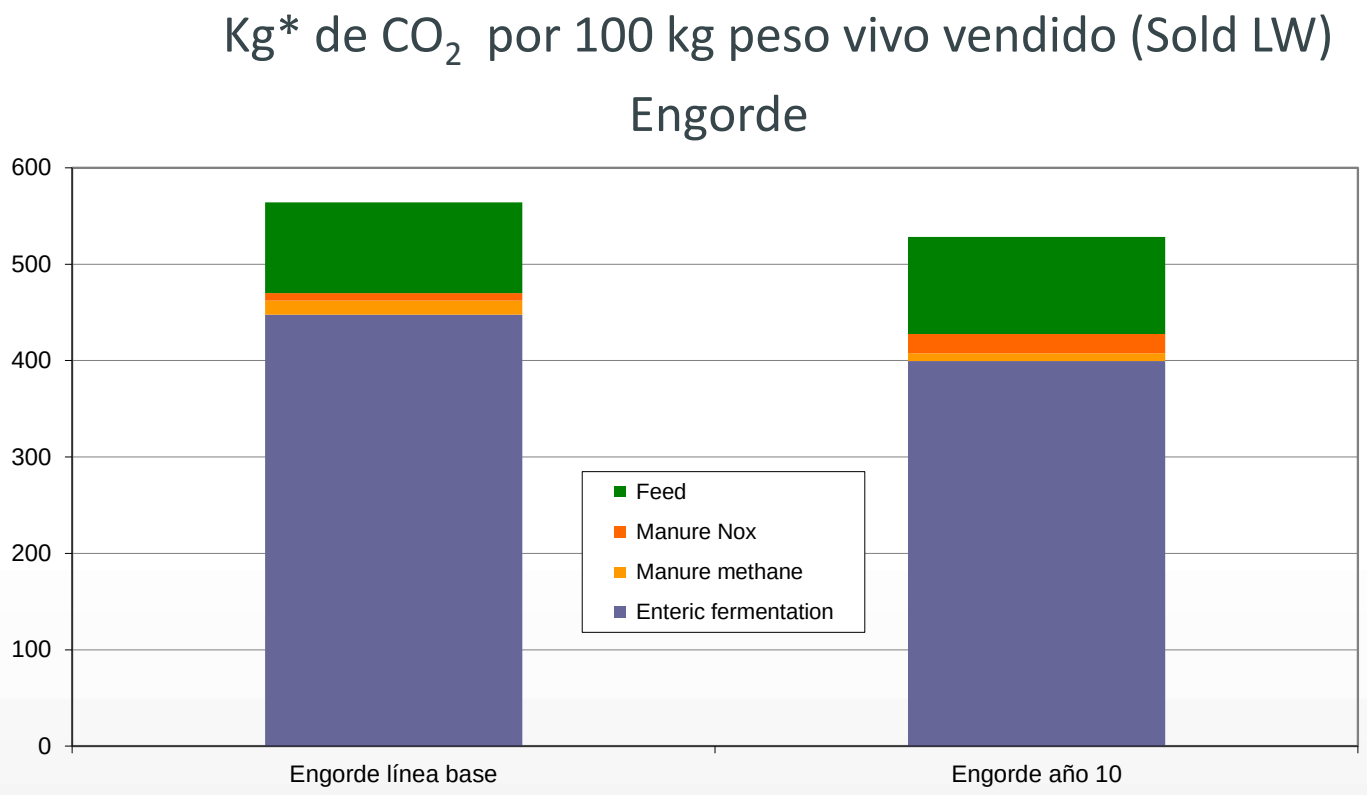
Farm	Feeding	Breed	Environment	Behaviour	Health
El Hatico, Cauca valley	Good quality, green forage eg Leucaena Clean water available ad libitum. Max distance to water: 150m	Breed suited to local environment – Lucerna (an indigenous breed) Animals were selected for short hair, good walking ability, compact 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	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.

Resultados preliminares – Emisiones de CO_2



* Equivalentes de CO_2

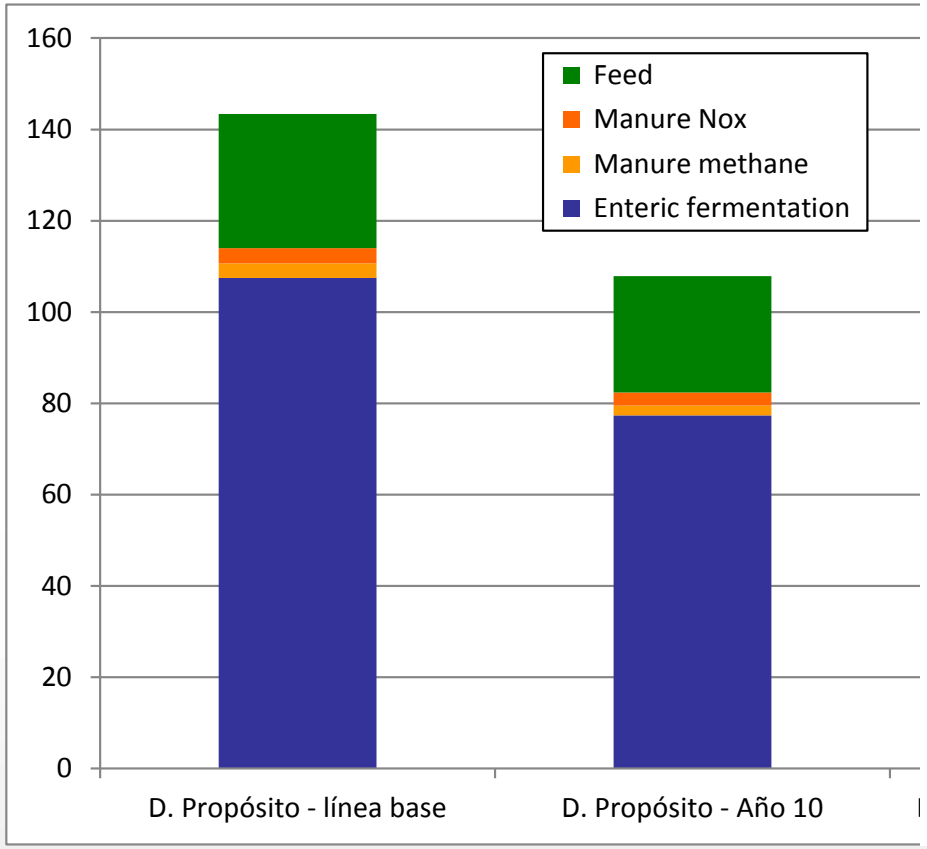
Resultados preliminares – Emisiones de CO_2



* Equivalentes de CO_2

Resultados preliminares – Emisiones de CO_2

D. Propósito Kg* de CO_2 ** por 100 kg LCE***



* Equivalentes de CO_2

** Emisiones calculadas únicamente para las vacas en producción

*** Leche Corregida por Energía

Resultados preliminares – Huella hídrica (producción carne*)

Uso del agua (engorde)

Water use	Year 1	Year 10	Diff.	% change
Water use per animal	3.313	2.583	-730	-22%
Total water per kg weight sold	33	29	-4	-13%
Total water per kg weight added	22	18	-4	-19%

* Cálculo único para la producción de carne, no incluye prod. de forraje

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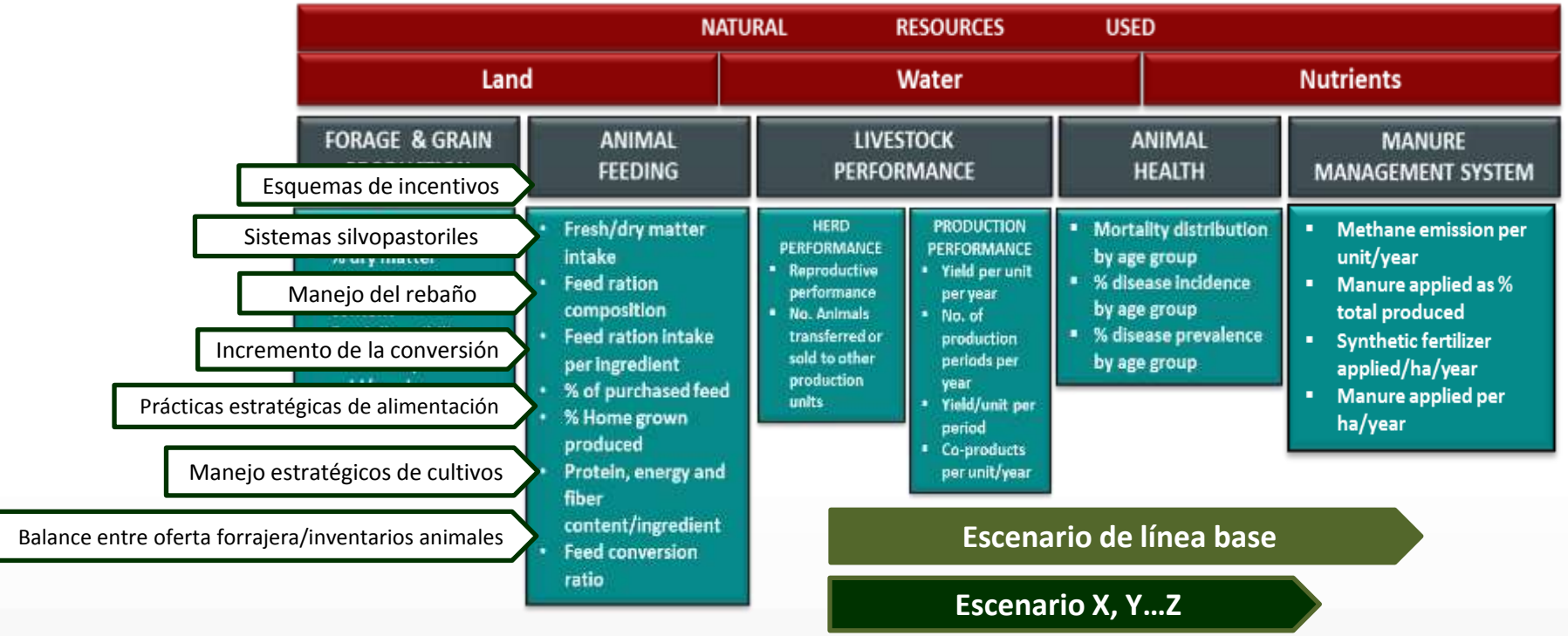
3. **Next steps**

Modelación - simulación



Económica → Bienestar Animal → Impacto social → Medio ambiental

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).

Final conclusion

We need to:

Measure

Illustrate

Standardize

Potentitialities of the silvopastoral systems

Gracias...thanks

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

4. Preliminary conclusions

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Próximos pasos en el análisis de los sistemas silvopastoriles

1. **Ampliar la cobertura de estudios de caso de los SPS donde se pueda medir e ilustrar las diferencias regionales.**

2. **Profundizar el análisis del impacto financiero cuando se adoptan los SPS.**
   a. Definir períodos críticos de inversión
   b. Cuantificar las necesidades de flujos de caja
   c. Análizar el impacto de diferentes opciones de financiación (análisis de riesgo).

3. **Ampliar los estudios en 4 dimensiones:**
   a. Otras regiones con ecosistemas diferentes
   b. Evaluar las diferentes opciones de SPS (menú de acuerdo a condiciones regionales)
   c. Tamaño de la superficie a intervener
   d. Tiempos empleados en la adopción de los mismos