

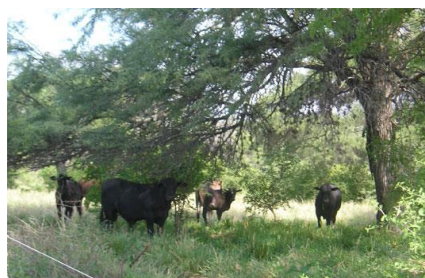
Applied Science and Technology Transfer to strengthen the sustainability and resilience of livestock in Argentina





Table of contents

- ☐ Livestock farming in Argentina and its contribution to the National GHG Inventory.
- ☐ Can livestock farming become a part of the solution?
- ☐ Applied Science & Technology Transfer
- ☐ Private and public initiatives.
- ☐ Conclusions.





Argentina



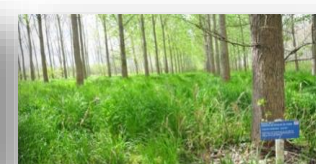
- ❑ Livestock farming: 53.9 million cattle, 12 million sheep, 4,5 million goats, 250 thousand domestic camelids on 110 million ha of diverse biomes



Arid & Semi-arid



Subtropical



Tempered "Pampas"



Sub-antartic Patagonia



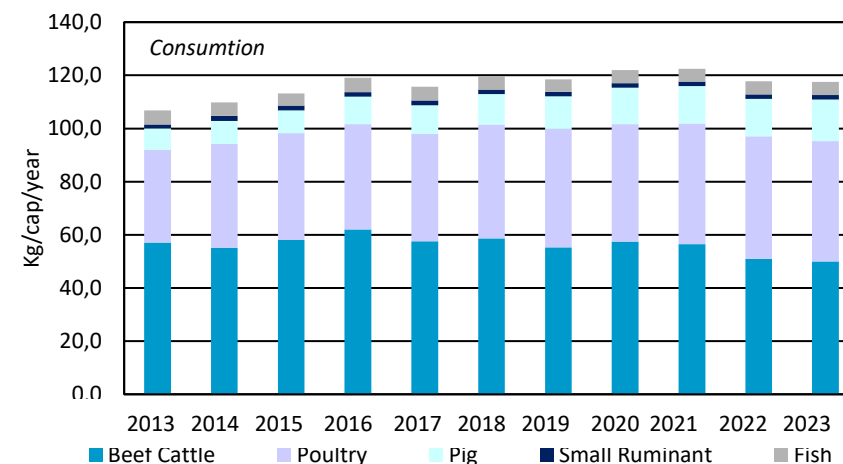
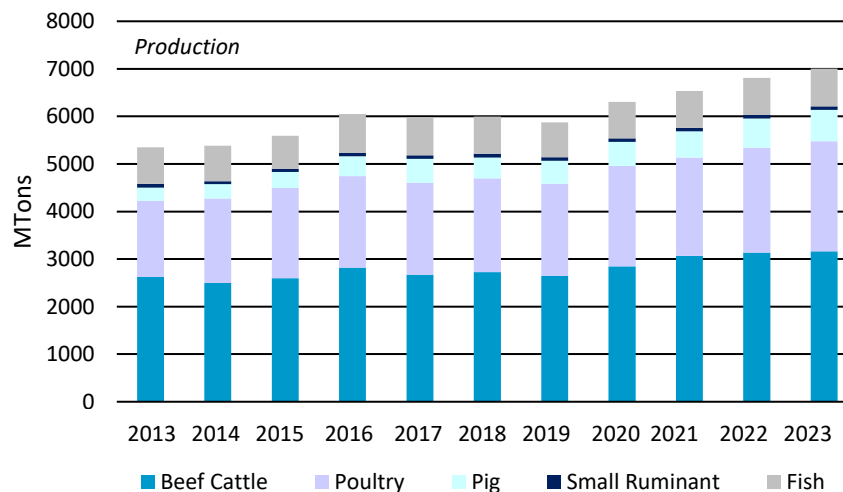
Challenge "Characterization of main production systems"



Meat, Dairy & Animal Fibers

- ❑ Meat production increase enhanced by poultry and pig
- ❑ Little increase in beef meat, more exportation
- ❑ Dairy production also increased with less but bigger farms
- ❑ 1 M jobs
- ❑ Exports > 6900 M US\$

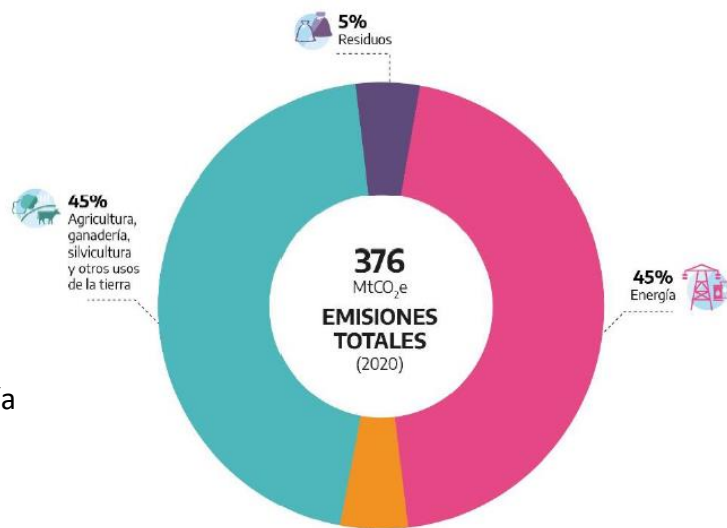
Chain	Export. (M US\$)	Jobs (k)
Poultry	180,4	115,1
Pig	12,0	90,3
Beef cattle	3544,0	422,3
Dairy	1181,0	187,5
Small ruminant	274,5	97,8
Fish	1777,0	24,5
Total	6968,9	937,5





❑ **Total emissions:** 376 MTCO_{2eq} (<1% global!!!)

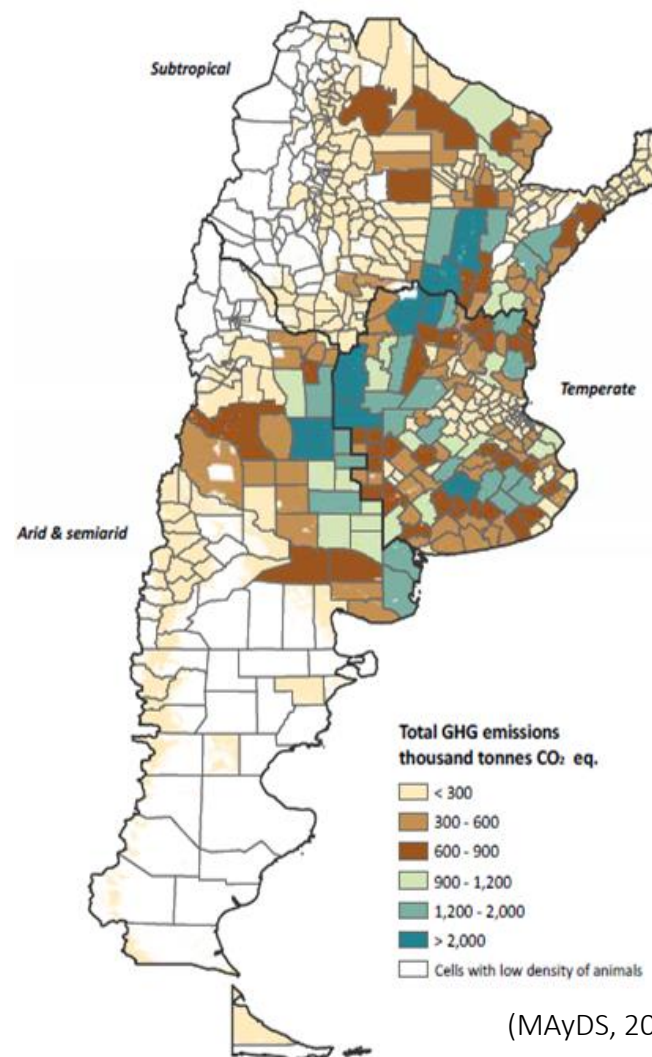
❑ **AFOLU:** 45% (169,6 MTCO_{2eq}): Livestock: 46% (22,2% total), Methane 71% of livestock (14,6% total)



Ganadería
46%

Emisiones GEI por subsector

Subsector (No IPCC)	Total MtCO _{2e}	%
Ganadería	78,63	22,2%
Transporte	50,22	13,9%
Generación de electricidad	47,83	11,0%
Cambio de uso de suelos y silvicultura	35,77	11,2%
Combustibles industrias	33,26	9,0%
Combustibles residencial	27,01	6,6%
Agricultura	21,12	5,8%



(MAYDS, 2024)



Can livestock farming in LATAM become part of the solution?

□ Background



Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv



Review

Reassessing the role of grazing lands in carbon-balance estimations:
Meta-analysis and review

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^e Instituto de Suelos, Instituto Nacional de Tecnología Agropecuaria, Nicolás Repetto y de los Reseros s/n, B1686, Hurlingham, Buenos Aires, Argentina

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^h Facultad de Ciencias Agrarias y Forestales, Universidad de La Plata, Diagonal 113 N°469-3th floor, B1900 La Plata, Argentina



Article

Lamb and Wool Provisioning Ecosystem Services in Southern Patagonia

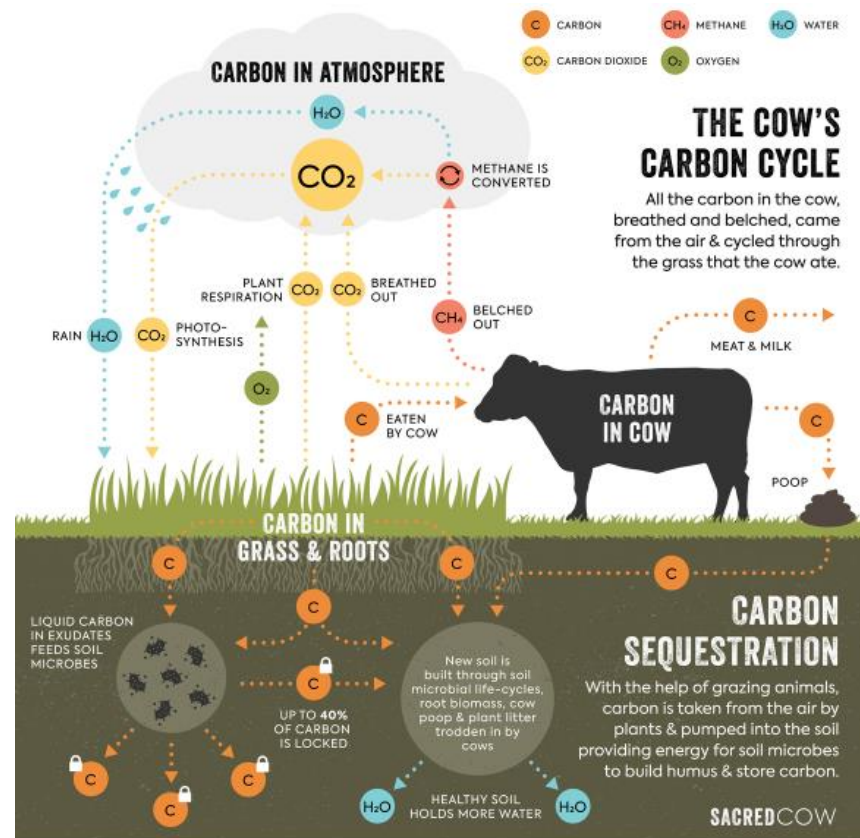
Pablo Luis Peri^{1,2,*}, Yamina M. Rosas³, Emilio Rivera¹ and Guillermo Martínez Pastur³

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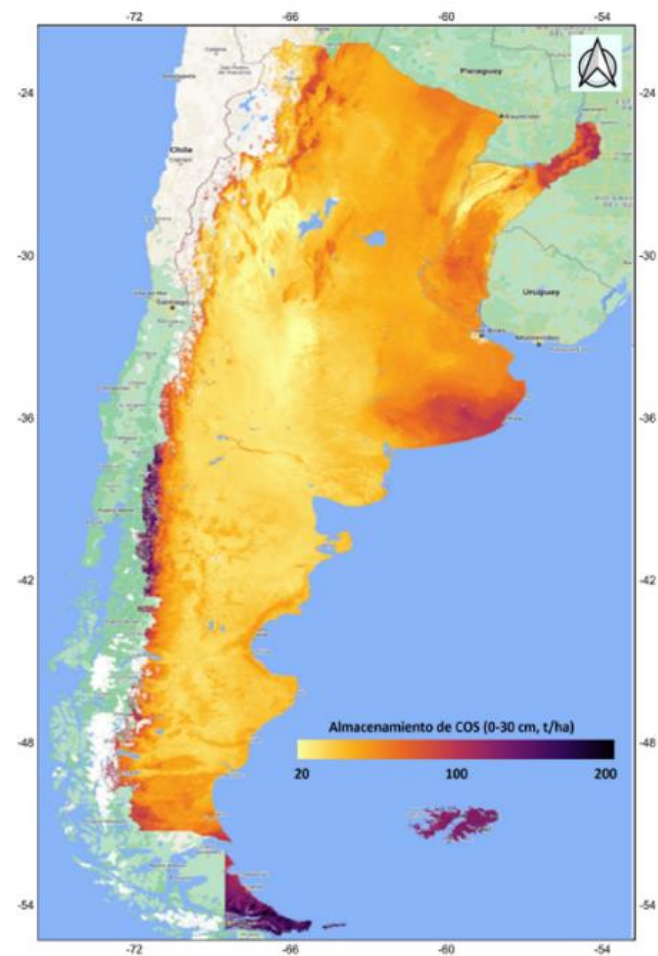
* Correspondence: peri.pablo@inta.gob.ar





Applied Science

- ❑ Large scale studies: soil carbon maps





Applied Science

☐ Mitigation options

Strategy	Treatment	Effects	Method	Animals	Location
Production cycle	Weaning age traditional vs. early	=	SF6	Cows & Angus Steers	Humid Pampa
	Lactation grazing	+10 gCH4/anim/d	SF6	Dairy cows	Humid Pampa
	Fed lot vs. grazing	-40% gCH4/kg DM	SF6	Angus steers	Humid Pampa
Pastures	Lotus (tannins) vs. grassland	-28% gCH4/kg DM	SF6	Angus steers	Humid Pampa
	Alfalfa/Fescue vs CC (V, RG, NF)	-30% gCH4/kg DM	SF6	Angus steers	Humid Pampa
	Spring vs. Summer	=	SF6	Angus steers	Humid Pampa
Supplement	Corn grain (18/LW) + Alfalfa/Fescue	-36% gCH4/kg DM	SF6	Angus steers	Humid Pampa

Mean emission reduction of 20%

Better technologies can reduce emissions by 40%

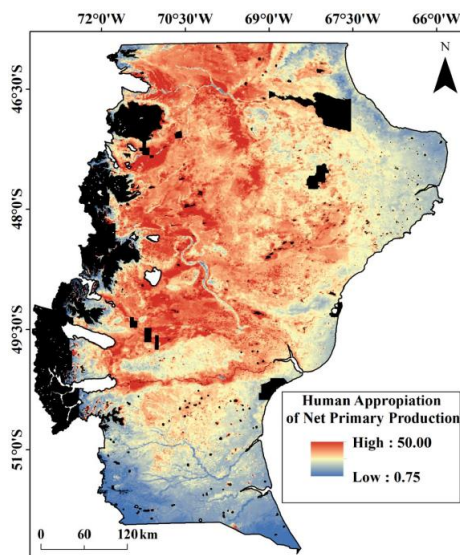
Additives	Nitrates (1,5% + TMR)	-21% gCH4/kg DM	SF6	Holstein steers	Humid Pampa
	Nitrates + Hay	-30% gCH4/kg DM	SF6	Angus steers	Humid Pampa
	Protected lipids (0,7 kg/d + TMR)	=; improve milk quality	SF6	Dairy cows	Humid Pampa
	Popoleo	-34% mLCH4/kg degOM	In vitro - BM	-	Humid Pampa
	Essential oils	-10 mLCH4/kg degDM	In vitro - Rusitec	-	Humid Pampa
Byproducts	DDGs corn 0,5%LW + Gatton panic	=	SF6	Braford steers	Northwest
	DDGs corn 0,5%LW + Silvopastoralism	=	SF6	Braford steers	Northwest
	DDGs + Hay C4 species	-35% gCH4/kg DM	CR	Sheep	Lab.
	DDGs + Barley vs. TMR	-26% gCH4/kg DM	CR	Sheep	Humid Pampa
	Soybean hulls vs corn grain	=	SF6	Dairy cows	Humid Pampa
	Cotton seed 0,5%LW + Hay C4	-33% gCH4/kg DM	SF6CR; In vitro - BM	Braford steers	Northwest



Carbon balance

Patagonia sheep farming

Ecological Area	Net Carbon Balance (kg C/ha/year)
Andean Region	780.8 c (401.3–1073.1)
Humid Magellanic Steppe	203.7 b (130.8–244.2)
Dry Magellanic Steppe	110.3 ab (18.8–228.1)
Mata Negra Thicket	168.5 b (42.6–330.5)
Central Plateau	−7.11 a (−93.6–103.9)
<i>p</i> -value	107.62 (<0.0001)

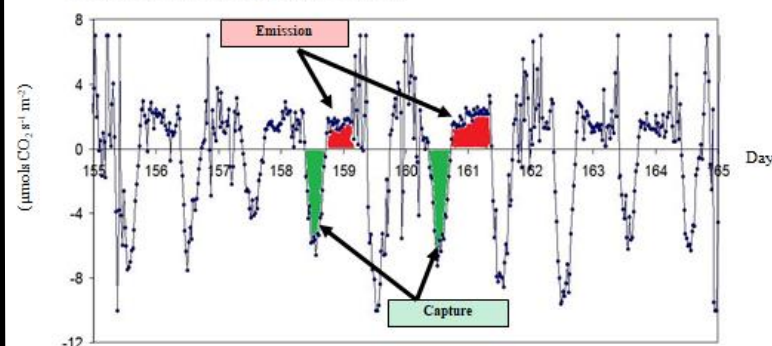


- ✓ Most ecological areas have a positive net carbon balance, HANNP 0,75 to 50%

Tempered Pampa



CO₂ net fluxes during 10 days of winter



Questions:

- Yearly C flux dynamic
- Intra and inter annual variation
- Pasture based systems are Carbon Positive?

Net flux 10 days:
capture ≈ 32 kg.ha⁻¹
3,2 kg C .ha⁻¹.día⁻¹



Project I097

GHG emissions and carbon sequestration in agriculture, livestock and forestry production systems

Long term studies

Balance de carbono de sistemas ganaderos a partir de datos locales

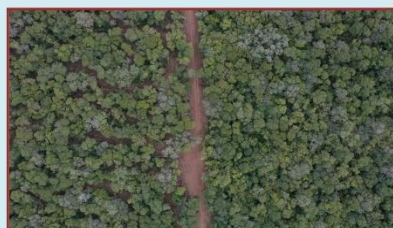
Mediciones de GEI y carbono en suelo-líneas de base

Recopilación de metadatos locales

Impacto de la tecnología en el balance de carbono

Co-contribución del conocimiento con las partes interesadas

Nodos Experimentales (NE) para el estudio de sistemas ganaderos representativos



NE Salta

Sistema silvopastoril en bosque nativo, bovinos para carne (MBGI)



NE IIACS Tucumán

Sistema silvopastoril-bovinos para carne



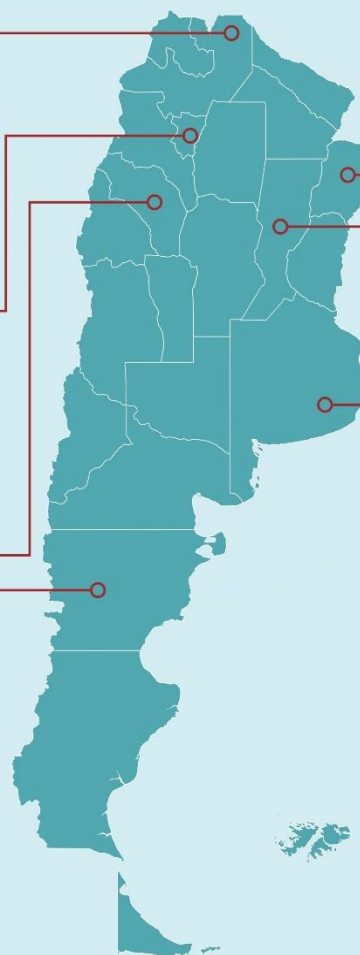
NE Los Cerrillos La Rioja

Sistema pastoril en pastizal natural, bovinos para carne



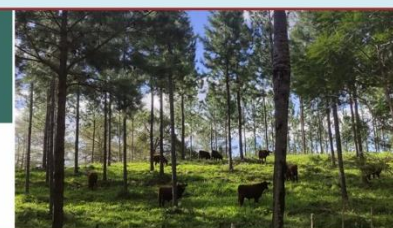
NE Río Mayo Chubut

Sistema pastoril en pastizal natural, ovinos para carne y lana



NE Cerro Azul Misiones

Sistema silvopastoril-bovinos para carne



NE Mercedes Corrientes

Sistema pastoril, bovinos para carne y ovinos



NE Rafaela Santa Fe

Sistema lechero-bovinos



NE Balcarce Buenos Aires

Sistema mixto-bovinos para carne

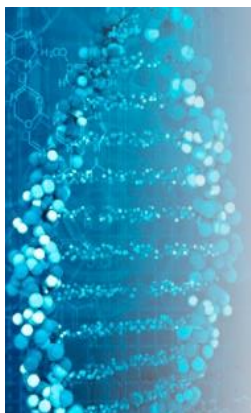




Innovation & Technology transfer

❑ Methane emission and residual feed intake phenotyping stations, breeding programs, genomic selection (beef and dairy cattle, sheep)

- ✓ Mercedes, Corrientes
- ✓ Rafaela, Santa Fe
- ✓ Cesáreo Naredo, Bs As
- ✓ Anguil, La Pampa
- ✓ Valle Inferior, Río Negro
- ✓ Trelew, Chubut
- ✓ Río Gallegos, Santa Cruz



ASOCIACION ARGENTINA
CRIADORES
CORRIEDALE

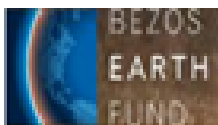




Innovation & Technology transfer

❑ Development of a global database for methane emission phenotypes

Global Methane Genetics –
Accelerating genetic progress to
reduce methane in ruminants



Vicente Vega-Murillo
René Calderón-Chagoya
Moises Montañó-Bermúdez



Embrapa

Alexandre Berndt
Fernando Cardoso



INIA
URUGUAY

Elly Navajas
Gabriel Ciappesoni



Mauricio Alvarez Sebastian Munilla

- ❑ INIA proposed to lead the group for LATAM.
- ❑ Available funding: USD 1.5 million.
- ❑ Group composed of INTA, EMBRAPA, INIFAP.
- ❑ Connections with other groups working on beef cattle. Australia - Steve Miller, AGBU, University of New England. United States - Bailey Engle, Clay Center, USDA.
- ❑ Aligned with the work carried out in the PROCISUR Sustainable Livestock Regional Group.





Innovation & Technology transfer

- ❑ Public-private agenda
- ✓ Communication program
- ✓ Estrategic alliances with farmer organizations, breeders, industries (meat, milk, wool)
- ✓ Training and professionalization
- ✓ Commercial strategies
- ✓ Collective learning networks





Innovation & Technology transfer

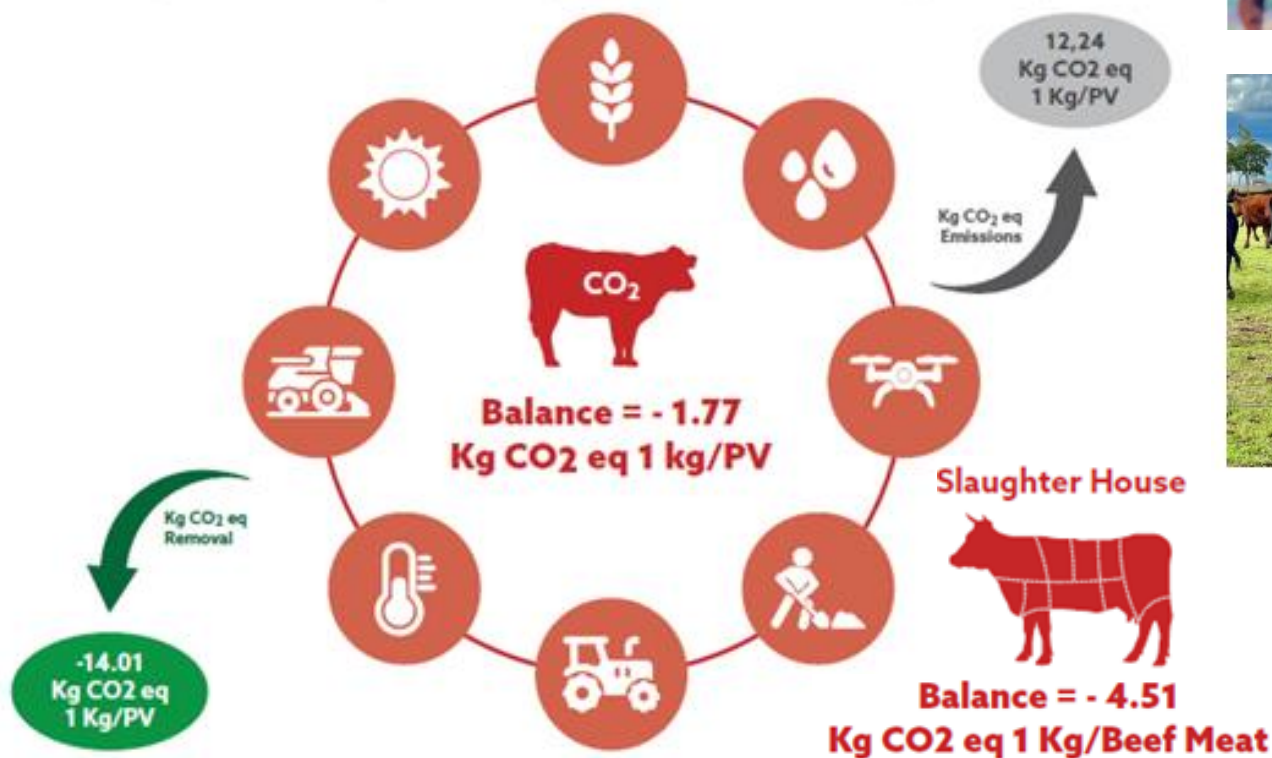
San Esteban S.A.

1 kg Beef Meat

Environmental Product Declaration

Global Warming Potential (GWP) of San Esteban S.A.

1 kg of bovine live weight (labelled of 1 kg of beef meat corresponds 2,701 kg of live weight).



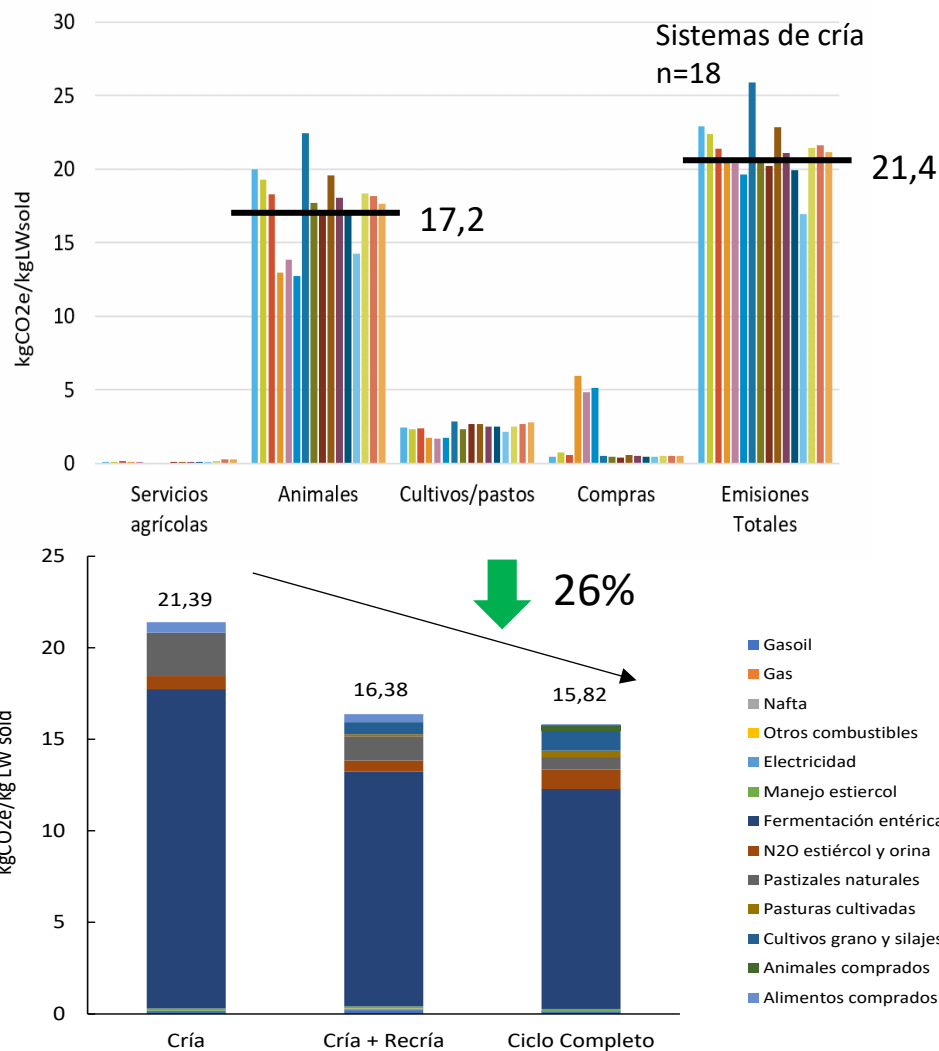
EPD®		EPD®	
		ARGENTINA	
EPD registration number:		S-P-07361	
CPC code:		2111.2113 Meat of mammals, fresh	
Program:		EDP International EDP® System	
Program operator:		EDP International AB	
Publication date:		2024-01-29	
Valid until:		2029-01-28	



Innovation & Technology transfer



MESA DE
**INNOVACION
GANADERA**
OLAVARRIA





Innovation & Technology transfer

❑ *Monetization of carbon capture*

Patagonia leads the race, and sheep have won the pole position. Three large farms in the south will receive the first 245 thousand dollars for carbon credits



por **Bichos de campo** — 13 mayo, 2023



The screenshot shows the 'rûuts' website with a dark blue background. At the top, the 'rûuts' logo is displayed. Below it, the heading 'Nuestros programas de carbono' is followed by two program boxes. The first box, labeled 'PROGRAMA POA', is blue and contains the text 'Destinado a productores de la Patagonia' and a 'VER MÁS' button. The second box, labeled 'PROGRAMA SARA', is orange and contains the text 'Destinado a productores en Sudamérica' and a 'VER MÁS' button.



Conclusions

- ❑ As we know, meat demand will continue to increase.
- ❑ Livestock farming is an important economic sector for many countries, including Argentina.
- ❑ Pasture-based production systems, which primarily rely on grasslands, play a role in carbon sequestration and can thus **become part of the solution to global warming**.
- ❑ We have identified **several mitigation options**, many of which are based on process technologies; however, some require long-term, amortizable investments (e.g., wire, water distribution, feeding infrastructure).
- ❑ There is considerable **public and private effort** to scale the adoption of more sustainable practices, such as improving grazing and nutritional management, animal welfare, and natural processes to enhance carbon offsets.
- ❑ The **sustainability** dimensions encompass not only environmental aspects but **also social and economic dimensions**.
- ❑ International efforts should not only focus on the development of collaborative and participatory learning networks but also on the **establishment of novel economic incentives for local farmers**, such as **payments for the provision of ecosystem services**.
- ❑ There is an increase in **commercial and other international regulations** focusing on the environmental impacts of livestock; however, many of these **conflict with national regulations**, such as land use planning at the regional scale.

Thank you for your attention





PROCISUR Working group – Sustainable Livestock

Developing mitigation strategies for the livestock sector in a collaborative approach across the Southern Cone

To estimate the productive, environmental, and economic benefit for farmers from implementing GHG mitigation strategies in the cattle sector to drive future development, investment, coordination and planning



Characterise the most relevant representative cattle production systems



Identify and prioritise the main strategies for mitigating methane and nitrous oxide emissions



Assess and prioritise the most appropriate mitigation options



Evaluate the economic impact and opportunity costs and implementation barriers



Developing mitigation strategies for the livestock sector in a collaborative approach across the Southern Cone

