Developing livestock breeding strategies for enteric methane mitigation in developing countries: the case of Latin America

- Elly Navajas
- Mauricio Alvarez
- Sebastian Munilla
- Gabriel Ciappesoni
- Vicente Vega-Murillo
- Rodolfo Cantet
- René Calderón-Chagoya
- Moises Montaño-Bermúdez
- Alexandre Berndt

ICAR Annual Meeting – May 2024 – Bled, Slovenia

Livestock production in Latin America

One of the main providers beef and dairy (larger net exporter)

Food security
(region, world)

Livestock industries
(GPD, livelihood, employment)

Economic and social relevance

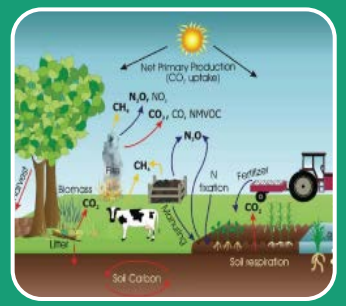
Biodiversity & ecosystem services

Transnational strategic ecosystems

Latin America and greenhouse gas (GHG) emissions

International Agreements

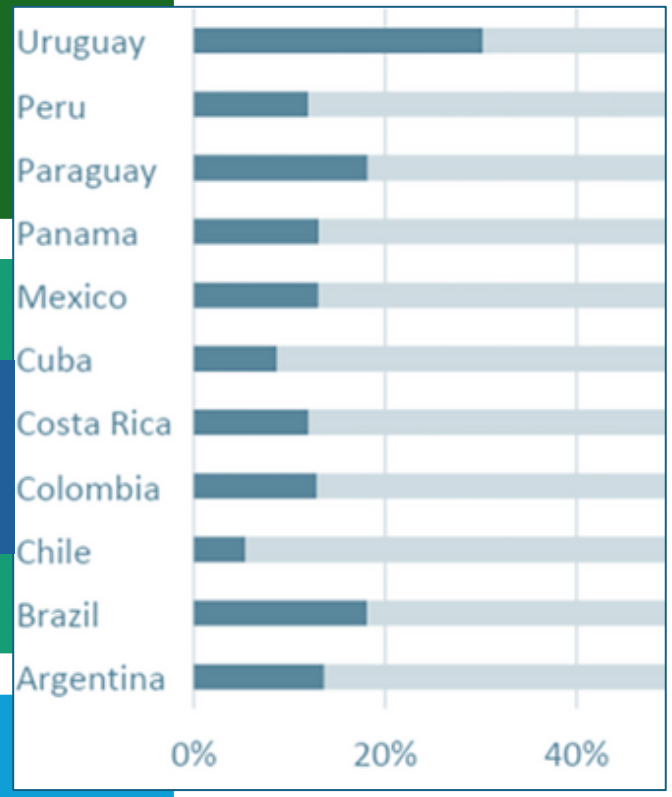
- National GHG inventories
- Mitigations targets – National Direct Contribution (NDC)



AFOLU sector

- **20 to 70% of total GHG**

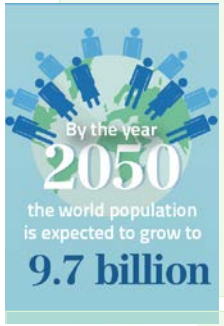
% Cattle emission of total GHG



Mitigation targets

- Proposed Reductions of GHG emission (2025, 2030)
- Emission intensities

Target: Reduction of methane emission intensity



Global growing demand for food and fibres

- Increasing agricultural production
- Opportunity for economic& social development

Environmental sustainability and GHG mitigation

- Conservation and biodiversity
- Reduction of methane emissions
- International agreements

Methane emissions

Production

- ✓ Reproductive performance
- ✓ Growth, finishing
- ✓ Wool production & quality
- ✓ Beef production & quality
- ✓ Animal health

Animal Breeding

RFI

Animal breeding for lower emissions

inifap
Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias

Embrapa

INIA URUGUAY

INTA

Methane phenotyping platform

GENETIC EVALUATION

Impact:
Beef producers for the region & world

Feasibility:
Methane emissions breeding values

Adoption:
Valorisation of genetics as mitigation tool

Main producers/exporters & national genetic evaluations

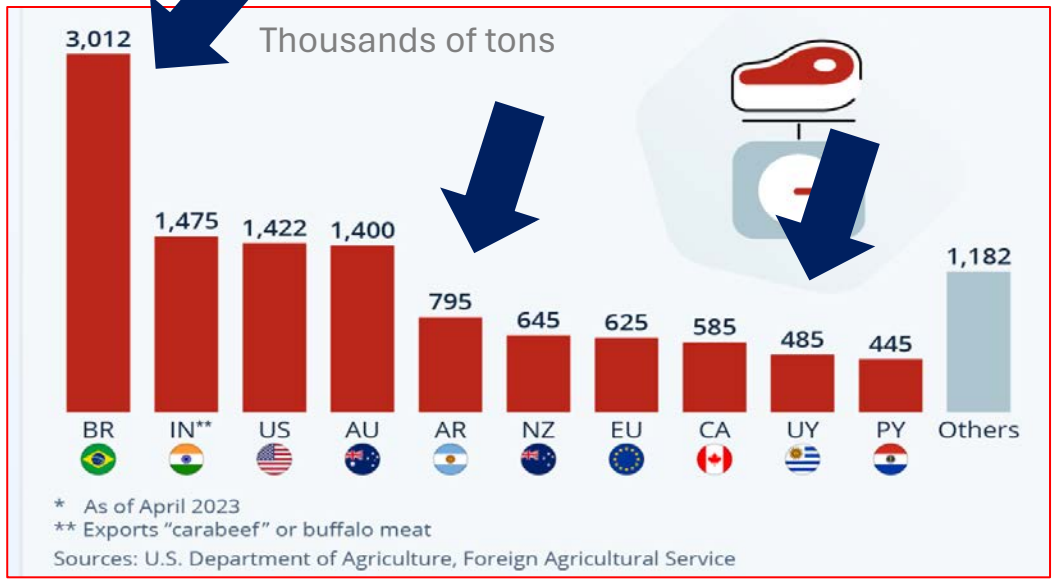
Impact:

Beef producers for the region & world

Top Beef Producers

Country	Beef produced (million tons)	Cattle heads (millions)
USA	12.89	92.08
Brazil	**10.35**	**193.78**
China	7.18	98.17
India	4.35	306.7
Argentina	**3.14**	**53.4**
Mexico	**2.18**	**17.31**
Australia	1.88	23.04
France	1.58	17.4
Canada	1.41	11.51
Russia	1.32	17.79

Top Beef Exporters



Main producers/exporters & national genetic evaluations

Impact:
Beef producers for the region & world

Feasibility:
Methane emissions breeding values

- **National genetic evaluations for 30 years**
  - Bos taurus
  - Bos indicus
  - Synthetics (taurus x indicus)

Breeds	Argentina	Brazil	Uruguay	Mexico
Angus	X	X	X	X
Hereford	X	X	X	
Limousin	X		X	X
Brahman	X	X		X
Nellore		X		
Simmental				X
Simbrah				X
Charolais				X
Brangus	X	X		X
Braford	X	X	X	X

Main producers/exporters & national genetic evaluations

Impact:
Beef producers for the region & world

Feasibility:
Methane emissions breeding values

- **National genetic evaluations for 30 years**
  - Bos taurus
  - Bos indicus
  - Synthetics (taurus x indicus)

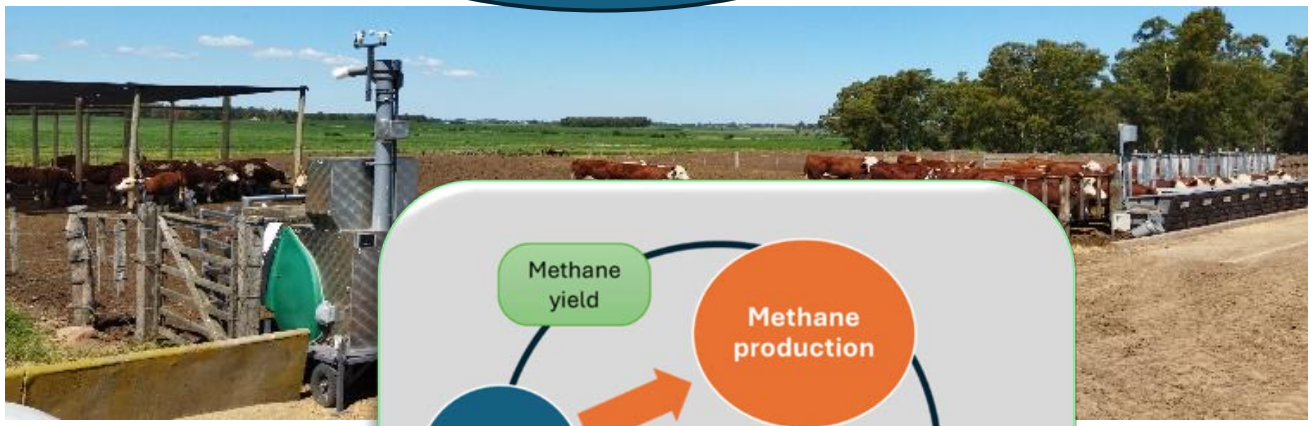
- **Genomic predictions in many of the breeds**
- **Feed efficiency integrated in breeding programs**
  - ✓ Growth, finishing
  - ✓ Reproductive performance
  - ✓ Beef production & quality
  - ✓ Animal health

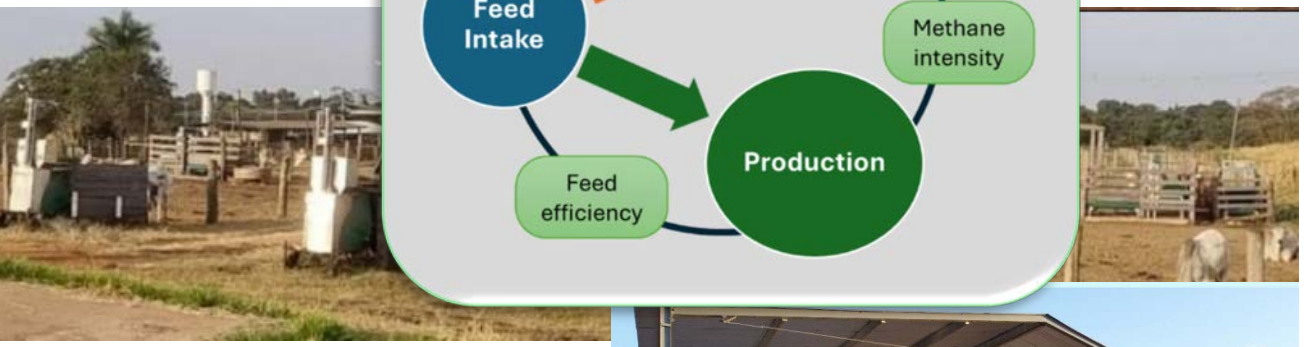
→ RFI

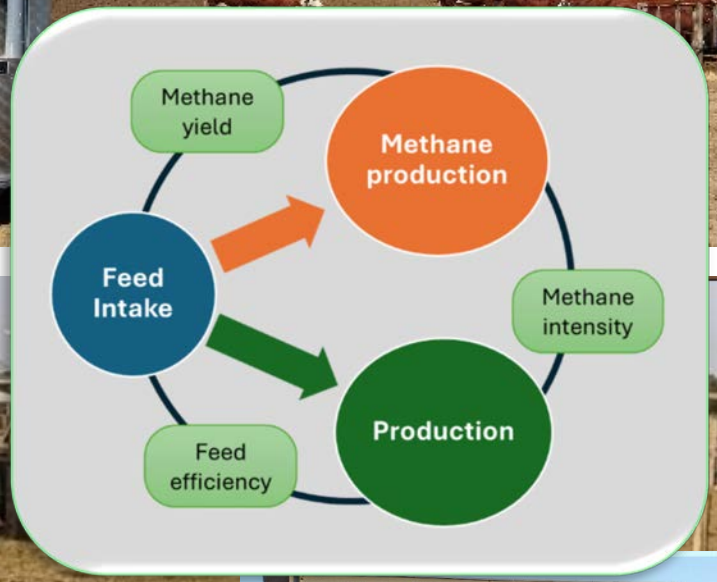
Breeds	Argentina	Brazil	Uruguay	Mexico
Angus	X	X	X	X
Hereford	X	X	X	
Limousin	X		X	X
Brahman	X	X		X
Nellore		X		
Simmental				X
Simbrah				X
Charolais				X
Brangus	X	X		X
Braford	X	X	X	X

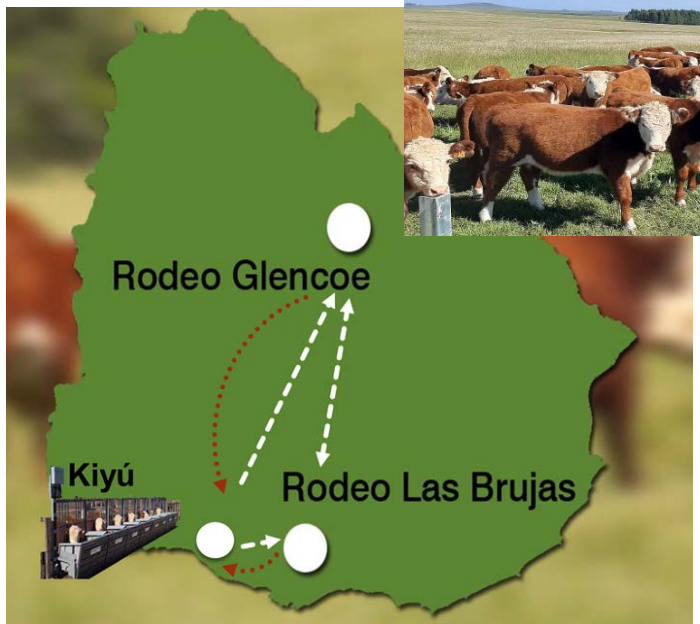
Integration of methane measurements

In association with RFI → Animals in or linked to genetic evaluations ← **In grazing conditions**









Information Nucleus

Communication with stakeholders

Impact:
Beef producers for the region & world

Feasibility:
Methane emissions breeding values

Adoption:
Valorisation of genetics as mitigation tool

Breeding tools

National Research Institutes & Universities

Responsible for genetic evaluations

Value

Animal breeding as cost-effective tool for mitigation and productivity

Adoption

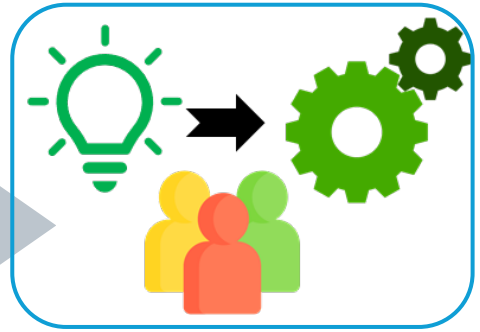
Links with: policy makers, GHG inventories, regional forums

Long lasting collaborations with breeder societies and private sector

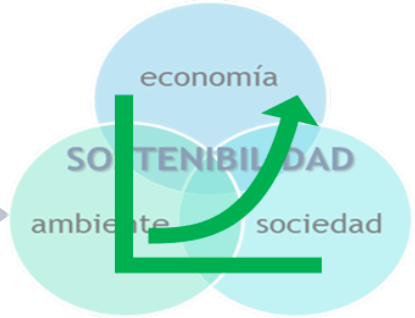
Incentives

Final comments

Comprehensive phenotyping
Animal DNA genotyping
Microbiota sequencing
Linked to genetic evaluations



Scientific knowledge
Genetic improvement tools
Training and development
Collaboration with other WGs



Contribution to mitigation goals without compromising food and fiber production

Many thanks

enavaja@inia.org.uy