


## Research on Nutrition and Greenhouse Gas Emissions from Livestock in Chile

**Camila Muñoz M., Ph.D**  
**INIA Remehue**

Network on 'Feed and Nutrition in Relation to Greenhouse Gas Emissions' (FNN)  
University of Reading, UK - June 2015



Ministerio de Agricultura  
Gobierno de Chile





## Chile National GHG Inventory

Inventario de emisiones de gases de efecto invernadero de Chile – Emisiones de CO<sub>2</sub>e (Gg CO<sub>2</sub>e)



**Sector Energía (emisión)**

**Sector Forestal (captura neta)**

Gobierno de Chile | Ministerio del Medio Ambiente

First National Communication (2000) and Second National Communication (2011);



## Chilean scientific publications on livestock and GHG

- Núñez, P., et al. (2010) Nitrogen losses under different cattle grazing frequencies and intensities in a volcanic soil of southern Chile. *Chilean J. Agric. Res.* 70.2: 237-250.
- Keim, JP, et al. (2014) Nutritive value, in vitro fermentation and methane production of perennial pastures as affected by botanical composition over a growing season in the south of Chile. *Anim. Prod. Sci.* 54.5: 598-607.
- Arias, RA., et al. (2015) Estimating enteric methane emissions from Chilean beef fattening systems using a mechanistic model. *J. Agric. Sci.* 153.01: 114-123.
- Muñoz, C., et al. (2015) Effects of concentrate supplementation on enteric methane emissions and milk production of grazing dairy cows. *Livestock Sci.* 175 : 37-46.
- Ungerfeld, EM. (2013) A theoretical comparison between two ruminal electron sinks. *Front. Microbiol.* 4:319
- Ungerfeld, EM. (2015) Shifts in metabolic hydrogen sinks in the methanogenesis-inhibited ruminal fermentation: a meta-analysis. *Front. Microbiol.* 37:6.



## INIA's experience with enteric CH<sub>4</sub> emissions

Funding body/Agency	Date of study	N	Mitigation strategy evaluated	Experimental treatments
Fondecyt 11110410	Sept 2012	24	Concentrate supplementation at grazing	1 vs. 5 kg concentrate
Fondecyt 11110410	Sept 2013	24	Improved forage quality	Low vs. High pregrazing herbage mass
FTG/RF-1028-RG	April 2014	24	Concentrate supplementation with forage diets	4 vs. 8 kg concentrate supplement
Fondecyt 1151355	Aug 2015	8	Oilseed supplementation	Flaxseed, Rapeseed, Cottonseed and Ca salts of LCFA
Fondecyt 1151355	Sept 2016	60	Oilseed supplementation	Flaxseed, Rapeseed, Cottonseed and Ca salts of LCFA

All measurements made using the SF<sub>6</sub> technique and Holstein Friesian cows



## Training for LatinAmerican Students

1. Measuring GHG in Livestock Systems Workshop
  - 1-2 Oct 2014, Osorno, Chile
  - 20 participants, 7 countries (SF<sub>6</sub> workshop) and 18 participants, X countries (N<sub>2</sub>O workshop)
2. Livestock Research and GHG Measurements Workshop
  - 8-23 Jan 2015, Osorno, Chile
  - 19 participants, 10 countries (SF<sub>6</sub> and N<sub>2</sub>O workshops)
3. 1st Scientific Conference on GHG from Livestock Systems of LatinAmerica:
  - 3 Oct 2014, Osorno, Chile
  - 9 papers on N<sub>2</sub>O and 14 papers on enteric CH<sub>4</sub>
  - 81 participants
4. Rumen microbes and methane Mini-symposium
  - 4 Oct 2014
5. 2 Undergraduate thesis



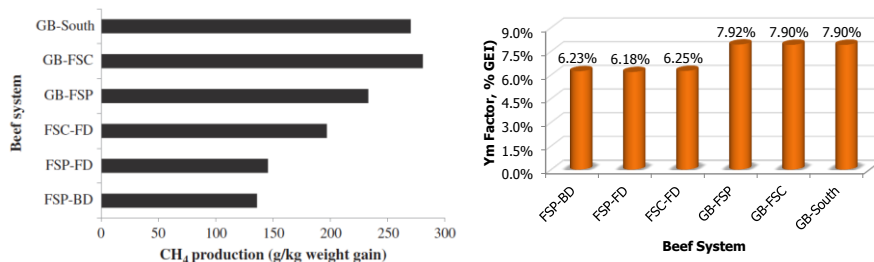


## Looking into the future

- Explore alternative dietary CH<sub>4</sub> mitigation strategies for grazing conditions
  - Algae supplementation
  - Tannin-containing plants
  - Interactions between strategies
- Contribute to broader environmental assessment of sustainable livestock systems
- International collaboration



Arias, RA., et al. (2015) Estimating enteric methane emissions from Chilean beef fattening systems using a mechanistic model. *J. Agric. Sci.* 153.01: 114-123.



(a) FSP-BD Central Chile backgrounding diet with a Forage:Concentrate (F:C) ratio of 24:76.

(b) FSP-FD Central Chile finishing diet with F:C ratio of 22:78.

(c) FSC-FD Southern Chile finishing diet with F:C ratio of 56:44.

(d) GB-FSP Southern Chile (simulated) 100% grass-fed.

(e) GB-FSC Southern Chile (simulated) 100% grass-fed.

(f) GB-South traditional finishing system for Southern Chile.

In all grass-based scenarios (GB), ADG was assumed to be 0.90 kg/day and DMI of 1% NDF as a proportion of BW .



**THANK YOU!**

**Instituto de Investigaciones Agropecuarias  
INIA Remehue  
Ministerio de Agricultura**

*camila.munoz@inia.cl*

