Environmental assessment of two dairy systems in Brazil South

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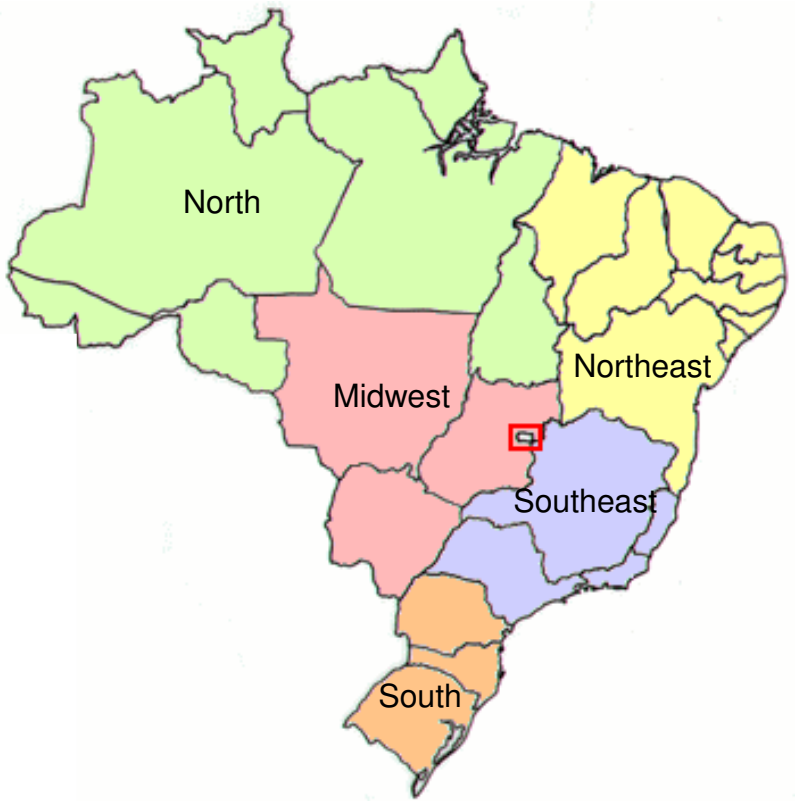
Introduction

- In Brazil the dairy farming has two distinct characteristics: a national coverage and variability in production systems;

- The genetic variability and the feeding management are important variables;



Introduction

- Great diversity of milk production systems in Brazil:

  Freestall, Rotative Pasture, Semi-confinement

Introduction

- The milk production in BR grew 4.1% per year (2003 to 2007), varying more than 8.8% in Santa Catarina state.

Introduction

Santa Catarina state production is characterized by:

- Small farmers spread all over the territory;
- Many different production systems with different levels of technology;
- An average area of less than 50 ha;
- Being an important activity for the economy, especially the small farms;

Introduction

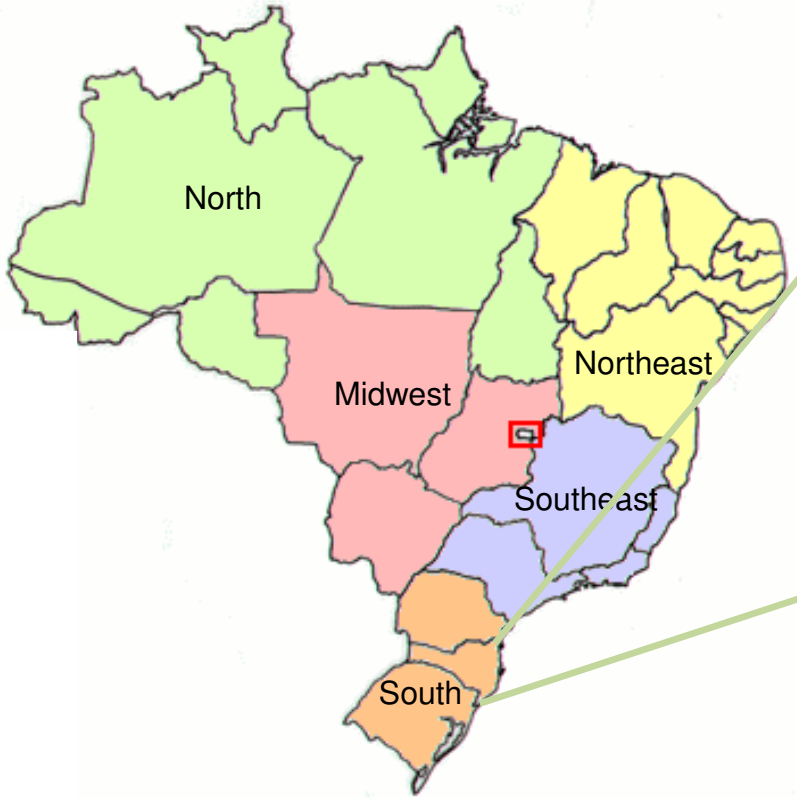
Livestock system in Santa Catarina state is based on rotational and continuous grazing:

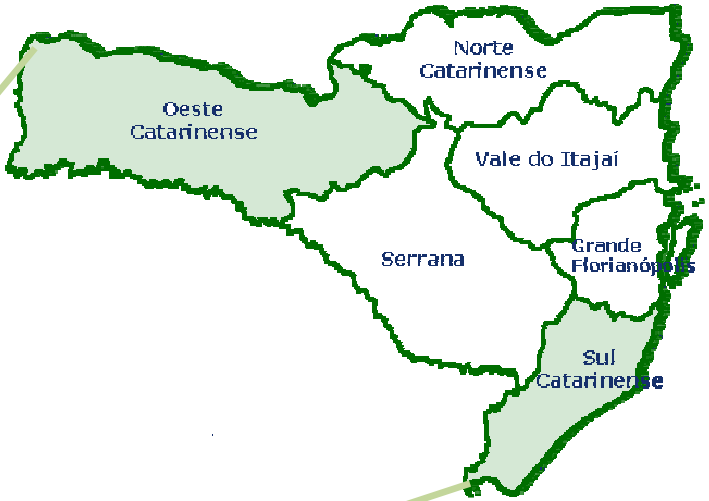
characterized by the grazing subdivision in a variable number of picket, which are used one after another.

characterized by keeping the animals continuously in a same area without interruption.

Methodology

Studied regions





800m

Above Cfb

Under Cfa

The climate in this state is:

- Cfb: mesothermal humid with hot summer
- Cfa: mesothermal humid with cool summer

Methodology

Goal and scope

- The objective of the study was to compare the environmental impacts associated with the milk production in farms of two regions of Santa Catarina state;

- Period: from July 2004 to June 2005;

Methodology

- Functional Unit was set to produce 1 kg of cooled milk in the farm;
- The system limits considered were:

Production of agricultural machinery	Production and combustion of diesel	Transport of agricultural harvest (250Km)
Production and use of chemical inputs	Production of pesticides and organic fertilizers	Production of pasture
Fodder and grain	Consumption of energy and materials for cleaning and disinfection	

Emissions: air, water and soil and emissions from enteric fermentation were also included;

The production of related goods was not considered due to unavailability of data;

Methodology

Inventory analysis

- Data were provided by the *Epagri (A Governamental Agriculture Research Institution)*;
- 22 dairy farms of Santa Catarina state were studied:

West (8 farms)

South (14 farms)

with medium level of technology

Methodology

Food production

Grain drying

Burning diesel

Electric power

the processes have been adapted for the Brazilian situation

- Used the software SimaPro and the database used was Ecoinvent®;
- Although this database is specific to Europe, it was considered that most of the production processes are similar;

Methodology

Environmental impact assessment

- The LCIA method used was CML 2001 (baseline) and were added:

Land Occupation

Total Cumulative Energy Demand

Methodology

- Results are presented for the following impact categories:

Acidification

Eutrophication

Climate change

Terrestrial ecotoxicity

Land occupation

Total cumulative energy demand

Results and discussion

Environmental impacts of dairy farms in the West and South of Santa Catarina state, per kg of cooled milk.

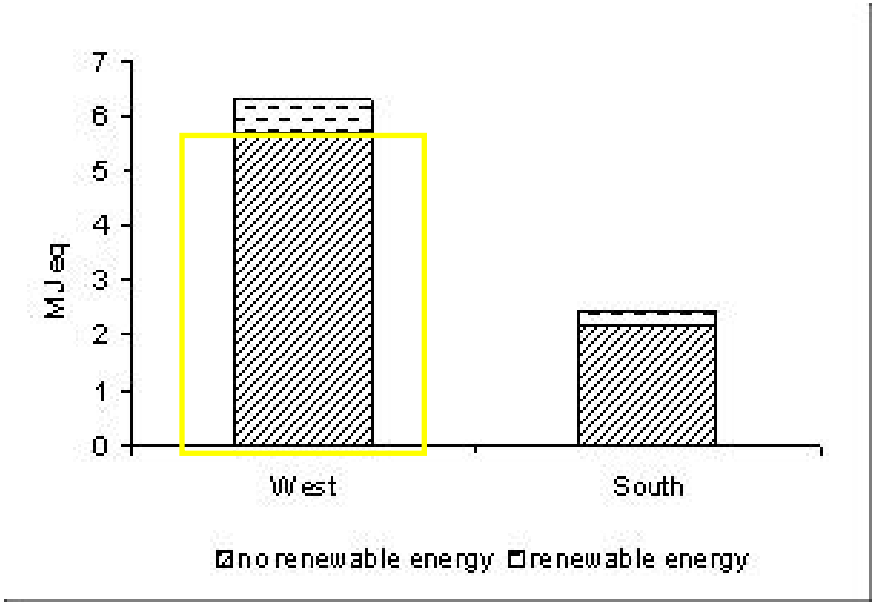
Impact category	Unit	West	South
Acidification	kg SO_2 eq (*100)	1.635	2.101
Eutrophication	kg PO_4 eq (*100)	1.904	1.918
Global warming (GWP100)	kg CO_2 eq	1.692	1.420
Land occupation	m^2 a*	2.025	1.760
Total cumulative energy demand	MJ eq	6.278	2.470

Conclusion

CATEGORY	SOUTH	WEST
Climate change	↓	↑
Energy demand	↓	↑
Acidification	↑	↓
Land occupation	↓	↑
Eutrophication	↑	↓

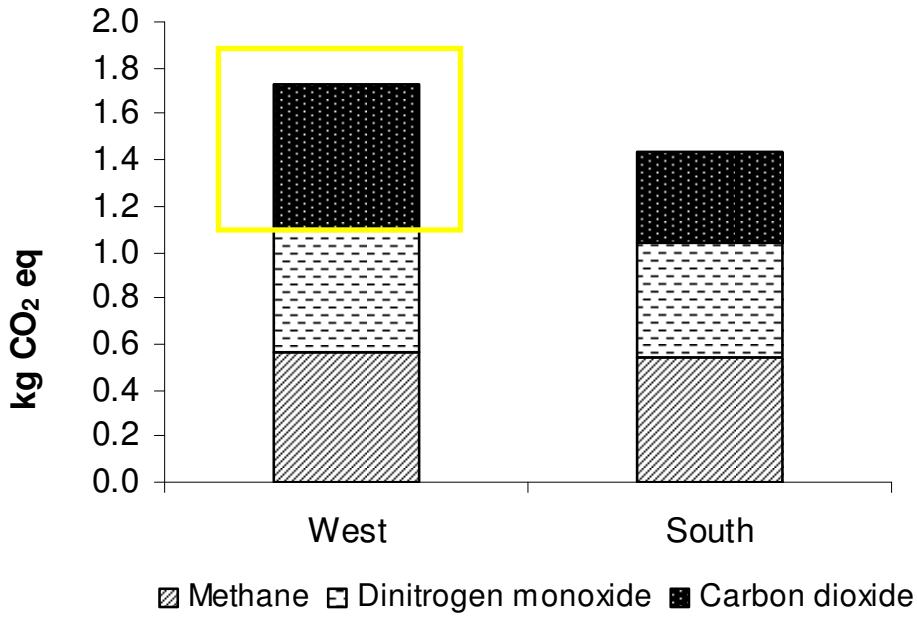
Results and discussion

Energy demand from dairy farms in West and South of Santa Catarina state, per kg of cooled milk.



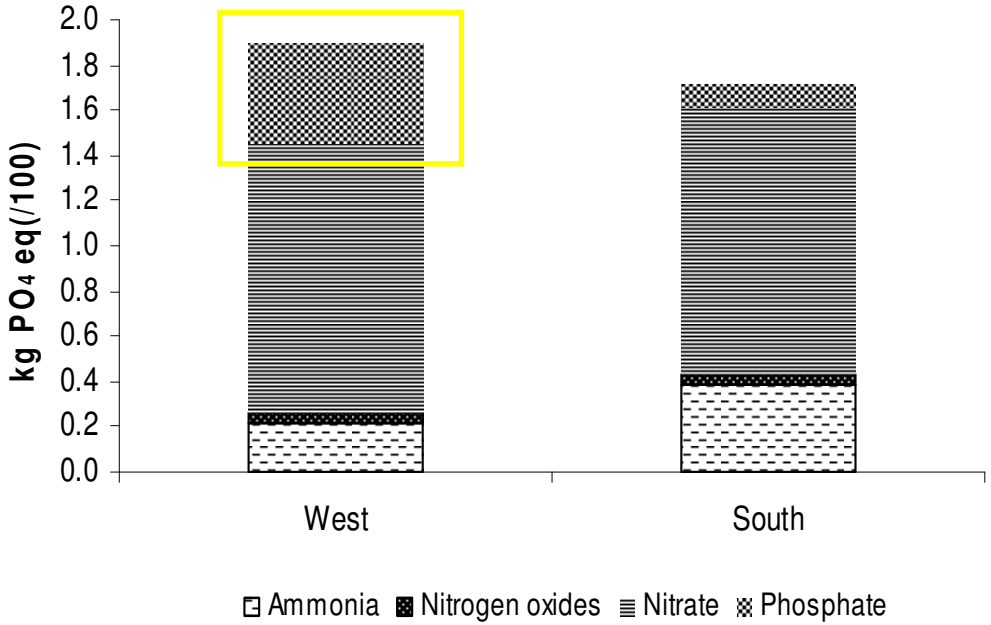
Results and discussion

- Greenhouse gases contribution (in kg of CO_2 eq) from dairy farms in West and South of Santa Catarina state per kg of cooled milk.



Results and discussion

- Eutrophication contribution (in kg of P_2O_4 eq) from dairy farms in West and South of Santa Catarina state per kg of cooled milk.



Conclusion

- The low productivity is the main cause of the higher impact observed in Santa Catarina state;

- The most striking factor is the production of feed for cows, so the system that consumes more food per kg of milk produced ends up impacting more;

Conclusion

- However there are different levels of emissions in each production system, the impacts are most associated with their productivity;

- The higher input of feed and fertilisers leads to large emissions of CO_2 eq., due to the use of fossil fuels;

Conclusion

- Because the data used in this study are still preliminary, the results should be carefully analysed, and should not be considered as a final conclusion of this research;

Acknowledgments

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