Sustainable Livestock Development
Restoring Value to Grasslands

"Grassland development & integration with cropping systems in Latin America"

Roberto Díaz
INIA Uruguay
Intensification and expansion of the agricultural border

Field Crops

Livestock

Forestry

Sugar Cane
Some regional differences in Latin America

• Northern Countries
  Mexico, Colombia, Venezuela, Ecuador, Perú.

• Southern Cone Countries
  Brazil, Bolivia, Chile, Argentina, Paraguay, Uruguay.
Cattle stock in Latin America & World in the last 50 years.

FAOSTAT 2011
Agricultural Expansion and Intensification
Area of Rainfed Grain Crops in the Northern Countries
(Mexico, Colombia, Venezuela, Ecuador, Peru)

HECTARS

FAOSTAT 2011
Area of Rainfed Grain Crops in Southern Cone Countries
Argentina, Bolivia, Brazil, Chile, Paraguay, Uruguay

FAOSTAT 2011
Grain Production Growth

- Increase of 220 million tons in 50 years
- Productivity: 3.1% annual increment
- Area Expansion: 53 million hectares

FAOSTAT 2011
Cultivated Pastures in the Brazilian Cerrado

60 Millions Hectars

Percentage of land under pasture:
- < 10%
- 10 - 20%
- 20 - 30%
- 30 - 40%
- > 40%

Source: Embrapa Cerrados based on IBGE Survey 1995-1996
Gran Chaco

Dry Chaco
Humid Chaco
Grassland Ecosystem

Pampas
Main Ecosystems

- Cerrado
- Great Chaco
- Pampas
# Area under No-tillage by Continent

<table>
<thead>
<tr>
<th>Continent</th>
<th>Area (hectares)</th>
<th>Percent of total/%</th>
</tr>
</thead>
<tbody>
<tr>
<td>South America</td>
<td>49,579,000</td>
<td>46.8</td>
</tr>
<tr>
<td>North America</td>
<td>40,074,000</td>
<td>37.8</td>
</tr>
<tr>
<td>Australia &amp; New Zealand</td>
<td>17,162,000</td>
<td>11.5</td>
</tr>
<tr>
<td>Asia</td>
<td>2,530,000</td>
<td>2.3</td>
</tr>
<tr>
<td>Europe</td>
<td>1,150,000</td>
<td>1.1</td>
</tr>
<tr>
<td>Africa</td>
<td>368,000</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>World total</strong></td>
<td><strong>115,863,000</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Rolf Derpsch et al 2010
Challenges and opportunities for development of integrated crop-livestock systems
60M ha of “Degraded Pastures”
Long term Experiment on Crop-pasture Rotations at La Estanzuela, Uruguay, 1963.....
How does it work?

<table>
<thead>
<tr>
<th>Year 1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat + Pasture</td>
<td>Pasture 2</td>
<td>Pasture 3</td>
<td>Pasture 4</td>
<td>CORN</td>
<td>SOYBEAN</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Barley</td>
<td>Corn</td>
</tr>
</tbody>
</table>
Organic Matter Dynamics in Crop-pasture Rotation and Continuous Cropping

![Graph showing organic matter dynamics over time.](image)
Total Nitrogen Dynamics in Crop-pasture Rotation and Continuous Cropping
Impacts of Higher Energy Prices on Agriculture and Rural Economies

Ronald Sands and Paul Westcott (coordinators)
Figure 2.2
Energy-related expenses, selected crops, 2007-08 average

Climate Change
Global annual rainfall trends: 1900-2000

Chile: ↓ 50%

SE South America: ↑ 23%

IPCC (2001)
The amount of rainstorms over 150mm-200mm during 1983-2002 was three times greater than those in 1959-1978, (Re et al, 2006).
Concluding Opportunities and Challenges

1. The productive expansion and intensification in LA impact in negative balance of SOC and TN in many agro-ecosystems in spite the increase in no-till.

Opportunities

1. The contribution of organic matter by legume pasture mixtures in rotation with crops was able to maintain or recover SOC in the long term even under conventional tillage.

2. Biological nitrogen fixation by legumes or any other BNF source takes a high economic relevance in livestock production with increasing prices of N.

3. Diversification through integrated crop livestock systems reduce productive risks by climate variability.
Challenges

1. Under cropping expansion by land availability integration with livestock is very much restricted.

2. The integration of crop and livestock production progressively requires two different farmers developing the system. One farmer taking care of animal production and another dedicated to the crop farming. A key issue for this contractual relationship is the long term commitment of both, taking advantage of mutual benefits of the integrated system.

3. The integrated crop livestock systems, proved to have great environmental and productive benefits, but its adoption requires public policies to overcome its complexity, when economic advantages are not significant.
Thanks !
Increase in cattle stock in the Southern Cone of LA in the last 50 years.

FAOSTAT 2011
Price relationship between Meat and Soybean

FAOSTAT., Farm gate prices per Ton.
Relación Carbono/Nitrógeno