Productivity in Emerging and Developing Countries
BRAZIL

Marcos Sawaya Jank
Managing Partner at PLATAFORMA AGRO (ICONE and Agroconsult)
Former CEO, Brazilian Sugarcane Industry Association (UNICA)
Importance of Brazilian Agribusiness

GDP (2012)
- 23%

Exports (2011)
- 36%

Employment (2009)
- 26%

Source: CEPEA/ESALQ.

Source: MAPA.

Source: IBGE (Input-Output Matriz).
Brazilian Trade Balance

Sources: SECEX/MDIC

Agribusiness: US$ 79 bn
Total: US$ 19 bn
Other Sectors: US$ -60 bn
Brazilian Agribusiness Exports
Increasing importance of developing countries

Developed Countries (CAGR 10%)

Developing countries (CAGR 21%)

2011:
- 47% → ASIA (China 20%)
- 32% → EU + US (60% when DDA was launched)

Source: Agrostat/MAPA. Elaboration: ICONE.
Net Trade Balance of Agribusiness Products

2000 (US$ billion)

1º - Canada 19,5
2º - Australia 12,2
3º - Brazil 10,7
4º - Argentina 10,3
5º - Thailand 7,7
10º - USA 2,3
11º - Indonesia 2,0
(-14º) - Russia -1,7
(-9º) - China -3,2
(-2º) - EU (27) -23,3
(-1º) - Japan -57,8

2005 (US$ billion)

1º - Brazil 30,7
2º - Canada 19,8
3º - Argentina 17,9
4º - Australia 14,6
5º - Thailand 10,7
6º - Indonesia 6,7
(-9º) - Russia -4,7
(-4º) - USA -13,1
(-3º) - China -16,5
(-2º) - EU (27) -30,1
(-1º) - Japan -59,9

2011 (US$ billion)

1º - Brazil 72,9
2º - Argentina 42,7
3º - Thailand 32,4
4º - USA 31,0
5º - Indonesia 25,7
6º - Canada 23,7
7º - Australia 20,5
(-4º) - Russia -11,3
(-3º) - EU (27) -28,1
(-2º) - China -80,1
(-1º) - Japan -84,9

Fonte: WTO
Brazilian Agri-Food Exports Dynamism (2011)

<table>
<thead>
<tr>
<th></th>
<th>Soybean</th>
<th>Sugar/ Ethanol</th>
<th>Chicken Meat</th>
<th>Coffee</th>
<th>Bovine Meat</th>
<th>Orange Juice</th>
<th>Tobacco</th>
<th>Pork Meat</th>
<th>Maize</th>
<th>Cocoa</th>
<th>Cotton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ranking</td>
<td>2nd</td>
<td>1st</td>
<td>1st</td>
<td>1st</td>
<td>1st</td>
<td>1st</td>
<td>1st</td>
<td>3rd</td>
<td>4th</td>
<td>8th</td>
<td>3rd</td>
</tr>
<tr>
<td>Share World</td>
<td>35%</td>
<td>46%</td>
<td>36%</td>
<td>33%</td>
<td>17%</td>
<td>77%</td>
<td>27%</td>
<td>8%</td>
<td>9.5%</td>
<td>4%</td>
<td>10%</td>
</tr>
</tbody>
</table>

![Bar chart showing exports in billions of US dollars]

**Sources:** AGROSTAT/Ministry of Agriculture, ITC, COMTRADE. **Elaboration:** ICONE
Total Factor Productivity Growth (TFP)

Annual Growth

<table>
<thead>
<tr>
<th>Region</th>
<th>2000-07</th>
<th>1990-99</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>3.6</td>
<td>3.3</td>
</tr>
<tr>
<td>Russia</td>
<td>3.1</td>
<td>-</td>
</tr>
<tr>
<td>South Africa</td>
<td>2.8</td>
<td>2.6</td>
</tr>
<tr>
<td>China</td>
<td>2.0</td>
<td>1.8</td>
</tr>
<tr>
<td>Southeast Asia</td>
<td>1.7</td>
<td>0.9</td>
</tr>
<tr>
<td>Arg, Chile, Par, Uru</td>
<td>0.3</td>
<td>-0.5</td>
</tr>
<tr>
<td>Asia (developed)</td>
<td>0.8</td>
<td>-</td>
</tr>
<tr>
<td>South Asia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Europe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Europe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USA and Canada</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia, N. Zealand</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TFP (Total Factor Productivity): represents resources efficiency (labor, capital and land).

Source: Alston, J.M., B.A. Babcock, and P.G. Pardey eds (2010). The Shifting Patterns of Agricultural Productivity Worldwide., CARD-MATRIC Electronic Book, Center for Agricultural and Rural Development. The Midwest Agribusiness Trade Research and Information Center, Iowa State University, Ames, Iowa, Available at: www.matric.iastate.edu/shifting_patterns
Expansion of the Agricultural Frontier

70’s and 80’s expansion based on tropical R&D, official rural credit, and intervention prices

90’s and 00’s expansion based on efficiency gains (productivity and scale), deregulation and stronger demand

Sources: IBGE and ICONE
Brazil - Total Factor Productivity Growth TFP (1975-2009)

Annual Growth

<table>
<thead>
<tr>
<th>Period</th>
<th>TFP Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1975-79</td>
<td>1.3</td>
</tr>
<tr>
<td>1980-89</td>
<td>1.1</td>
</tr>
<tr>
<td>1990-99</td>
<td>2.7</td>
</tr>
<tr>
<td>2000-09</td>
<td>5.6</td>
</tr>
</tbody>
</table>

TFP sources of growth

1. **Natural resources**: land and water availability, suitable climate
2. Large investments in **tropical R&D**
3. **Deregulation** and strong reduction of governmental subsidies
4. **Economies of scales** → migration of skilled farmers to Center-West

Source: Gasques & Bastos (2012)
Grains – Production, Area and Yields

Source: CONAB
Ag Land Productivity – Brasil vs. World

Source: Gasques, J.G; Bastos, E.T; (2012); USDA (2013)
What has changed in the last 10 years

TECHNOLOGY

<table>
<thead>
<tr>
<th>NPK Fertilizers (MMT)</th>
<th>Agrochemicals (Billion US$)</th>
<th>Machinery (1,000 tractors)</th>
</tr>
</thead>
<tbody>
<tr>
<td>19,1</td>
<td>2,8</td>
<td>33,2</td>
</tr>
<tr>
<td>CAGR 4.4%</td>
<td>CAGR 12.3%</td>
<td>CAGR 4.8%</td>
</tr>
<tr>
<td>2002</td>
<td>2002</td>
<td>2002</td>
</tr>
<tr>
<td>10</td>
<td>6,1</td>
<td>19,8</td>
</tr>
<tr>
<td>29,4</td>
<td>8,9</td>
<td>53,0</td>
</tr>
<tr>
<td>2012</td>
<td>2012</td>
<td></td>
</tr>
</tbody>
</table>

- Continuous adoption of **new tropical technologies**, including biotech/GMOs
- **No-till agriculture** and crop rotation
- **Double cropping** (2 crops in the same year)
- **Crop-livestock integration**

Source: ANDEF, ANDA, ANFAVEA.
Corn Outputs vs. Areas: Summer and Winter Crops

Brazilian exports 2012/13: 25 MMT (1st world)

Corn Production (MM Tons)
- Winter Crop: 46.5
- Summer Crop: 37.3

Planted Areas (MM Ha)
- Winter Crop
  - 2012/13: 15.0
  - 2011/12: 8.4
  - 2010/11: 6.6
  - 2009/10: 7.6
  - 2008/09: 7.0
  - 2007/08: 3.4

- Summer Crop
  - 2012/13: 15.7
  - 2011/12: 13.7
  - 2010/11: 13.0
  - 2009/10: 5.5
  - 2008/09: 14.3
  - 2007/08: 14.8

Source: CONAB

Table:

<table>
<thead>
<tr>
<th>Year</th>
<th>Winter Crop</th>
<th>Summer Crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012/13</td>
<td>15.0</td>
<td>15.7</td>
</tr>
<tr>
<td>2011/12</td>
<td>8.4</td>
<td>13.7</td>
</tr>
<tr>
<td>2010/11</td>
<td>6.6</td>
<td>7.6</td>
</tr>
<tr>
<td>2009/10</td>
<td>7.0</td>
<td>5.5</td>
</tr>
<tr>
<td>2008/09</td>
<td>8.4</td>
<td>14.3</td>
</tr>
<tr>
<td>2007/08</td>
<td>14.8</td>
<td>14.8</td>
</tr>
</tbody>
</table>
Simultaneous expansion of several crops (million ha)

“Cerrados” → diversification from the beef/soy model to corn, cotton, coffee, sugarcane, eucalyptus, dairy, poultry, pork

Sources: IBGE, ABRAF, UNICA, CONAB
Native vegetation: 554 Mha (66% of total area)

Urbanization: 38 Mha (5%)

Pastures: 170 Mha (21%)

Crops: 68 Mha (8%)

In 2022 the ag areas will increase 15 Mha, up to 83.6 Mha - 58.6 Mha grains, 15.3 Mha sugarcane and 9.5 Mha of planted forests

1. **Agriculture pressure on pastures until 2022:** 15.3 MM ha - current planted area in Brazil is 68.3 Mha (50.9 Mha grains, 10.3 Mha sugarcane and 7.1 Mha reforestation). In 2022 the planted area will be 83.6 Mha (58.6 Mha grains, 15.3 Mha sugarcane and 9.5 Mha reforestation.)


Source: Agroconsult, Bigma
Competition for Land – opportunity costs (avg 2006/07 to 2012/13)

Source: Agroconsult, Bigma
## Distribution of Farms by Size (ha)

### WORLD

<table>
<thead>
<tr>
<th>Size (ha)</th>
<th>Number of Properties (million)</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2</td>
<td>451</td>
<td>85</td>
</tr>
<tr>
<td>2-10</td>
<td>62</td>
<td>12</td>
</tr>
<tr>
<td>10-100</td>
<td>14</td>
<td>2.7</td>
</tr>
<tr>
<td>&gt;100</td>
<td>3</td>
<td>0.6</td>
</tr>
<tr>
<td>TOTAL</td>
<td>530</td>
<td>100</td>
</tr>
</tbody>
</table>

### BRAZIL

<table>
<thead>
<tr>
<th>Size (ha)</th>
<th>Annual Crops</th>
<th>Perennial Crops</th>
<th>Pastures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midwest</td>
<td>723</td>
<td>152</td>
<td>382</td>
</tr>
<tr>
<td>Southeast</td>
<td>144</td>
<td>55</td>
<td>58</td>
</tr>
<tr>
<td>South</td>
<td>41</td>
<td>33</td>
<td>41</td>
</tr>
<tr>
<td>Northeast</td>
<td>20</td>
<td>25</td>
<td>45</td>
</tr>
</tbody>
</table>

**Sources:**
- Brazil – IBGE Agricultural Census, Rabobank
### Previous experiences with large scale farming:
- Sugarcane
- Planted Forests
- Orange production
- Cotton
- Rice
- Feedlots (beef)

### Number of Farmers

<table>
<thead>
<tr>
<th>Size (1,000 ha)</th>
<th>2002</th>
<th>2012</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 400</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>200 – 400</td>
<td>4</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>100 – 200</td>
<td>1</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>50 – 100</td>
<td>3</td>
<td>19</td>
<td>40</td>
</tr>
<tr>
<td>30 – 50</td>
<td>1</td>
<td>11</td>
<td>40</td>
</tr>
<tr>
<td>TOTAL</td>
<td>5</td>
<td>38</td>
<td>115</td>
</tr>
</tbody>
</table>

Source: Agroconsult
Brazilian agribusiness: bottlenecks and challenges

The development of a global agri-food model in Brazil is a direct result of economic liberalization, industry deregulation, high investments in tropical R&D and migration of skilled farmers to areas where they gained economies of scale. It resulted in structural changes in all stages of the agri-food value chains, significant export-led growth and a distinct development of commercial and non-commercial farmers.

However it is necessary to remove barriers and bottlenecks such as:

1. **POOR INFRASTRUCTURE AND LOGISTICS**
   - New regulations to allow private investments (1.7% GDP vs. 8.2% GDP in China)
   - Opening the new North/Northeast routes – roads, railways, waterways

2. **REGULATORY RISKS**
   - Legal uncertainty due to unstable legislation over time (land use, environment and labor)
   - Flaws and reliability issues involving sanitary controls

3. **AGRI-FOOD PROTECTIONISM**: negotiations to reduce high tariffs, subsidies and NTBs

4. **OTHERS**
   - Lack of suitable financing and insurance mechanisms
   - Improved organizational structures to combine agricultural expansion and environmental conservation
Farms – economies of scale and double crop advantages

Harvesting Soy and Planting Corn in Mato Grosso

Cotton in Mato Grosso

Sugarcane in São Paulo
Global ranking, quality of infrastructure
1 = Best performer, 144 = Worst performer

- **Overall**
  - South Africa: 58
  - China: 69
  - India: 87
  - Russia: 101
  - Brazil: 107

- **Roads**
  - South Africa: 42
  - China: 54
  - India: 86
  - Brazil: 123
  - Russia: 136

- **Railways**
  - China: 22
  - India: 27
  - Russia: 30
  - South Africa: 46
  - Brazil: 100

- **Ports**
  - South Africa: 52
  - India: 59
  - China: 80
  - Russia: 93
  - Brazil: 135

- **Air transport infrastructure**
  - South Africa: 15
  - India: 68
  - China: 70
  - Russia: 104
  - Brazil: 134

Source: World Economic Forum
Poor infrastructure – roads
Poor infrastructure – roads

Federal Road BR-364
Poor infrastructure – Ports
Poor infrastructure – rail and waterways

USA – waterways and ports

USA – railways

Brazil - railways
How is the logistic changing – 5 years

- Extension of **North-South Railroad** ("Ferrovia Norte-Sul") to Estrela d'Oeste
- **BR-163** paving from Guarantã do Norte/MT to Santarém/PA
- **BR-080** construction and paving from Ribeirão Cascalheira/MT to Uruaçu/GO
- **BR-158** paving from Villa Rica/MT to Alô Brasil/MT
- **Marabá/PA** Fluvial Port and Port of **Vila do Conde/PA**
- **Miritituba/PA** Fluvial Port and Port of **Santana/AP**

Sources: DNIT, PAC, VALE, ALL, Ministério dos Transportes
Main Projects – 10 years

- Fluvial Port of Cachoeira Rasteira (MT)
- FIOL Railroad (“Ferrovia de Integração Oeste-Leste”)
- FICO Railroad (“Ferrovia de Integração do Centro-Oeste”)
- Railroad Estrela d’Oeste – Maracaju
- Railroad Maracaju – Mafra – Rio Grande
- Extension of North-South Railroad (“Ferrovia Norte-Sul”) from Açailândia (MA) to Vila do Conde (PA)
- Transnordestina Railroad

Legend:
- Roadway
- Railroad
- Hydroway
- City
- Port

Sources: DNIT, PAC, VALE, ALL, Ministério dos Transportes
THANK YOU!

MARCOS JANK

e-mail: marcos@jank.com.br
web: www.plataformaagro.com.br
Consulting in agricultural and livestock markets (database, market analysis, lectures)

Elaboration of technical and feasibility studies

Agricultural and livestock projects

Investment advisory and Due Diligence

Assets valuation

Agribusiness logistics

Market research (IPES Institute)

Events: sugarcane club, soy club, cotton club

Annual crop-livestock surveys: Rally da Safra and Rally da Pecuária

Modeling agriculture and land use change (outlook, market intelligence)

Evaluation of public policies and impact analysis (economic, environmental, social)

Sustainability issues (multistakeholder initiatives, LCA, certifications, compliance etc.)

International negotiations - trade, climate, biodiversity, bioenergy, biotech etc.

Advocacy strategy development

Communication strategies

Implementation of agriculture and technology transfer projects in third countries