



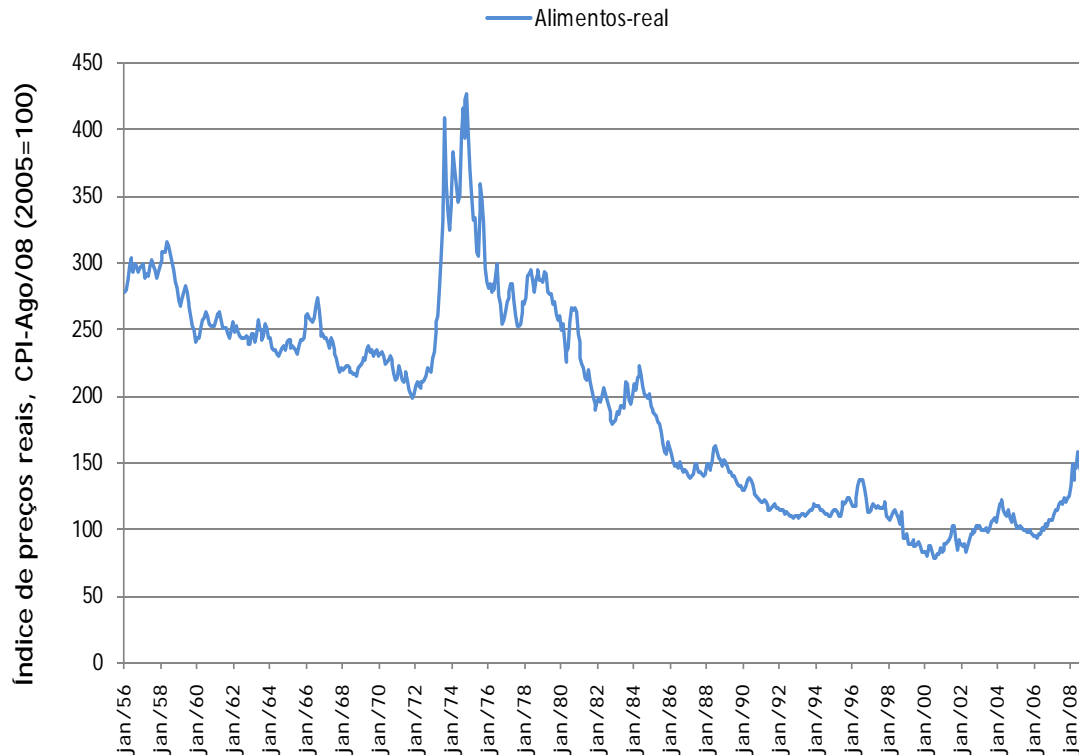
Brazilian Agriculture and Infrastructure

Geraldo Martha, Jr.



Cape Town, June 29 2011

The Macroeconomic Environment in the 1970's

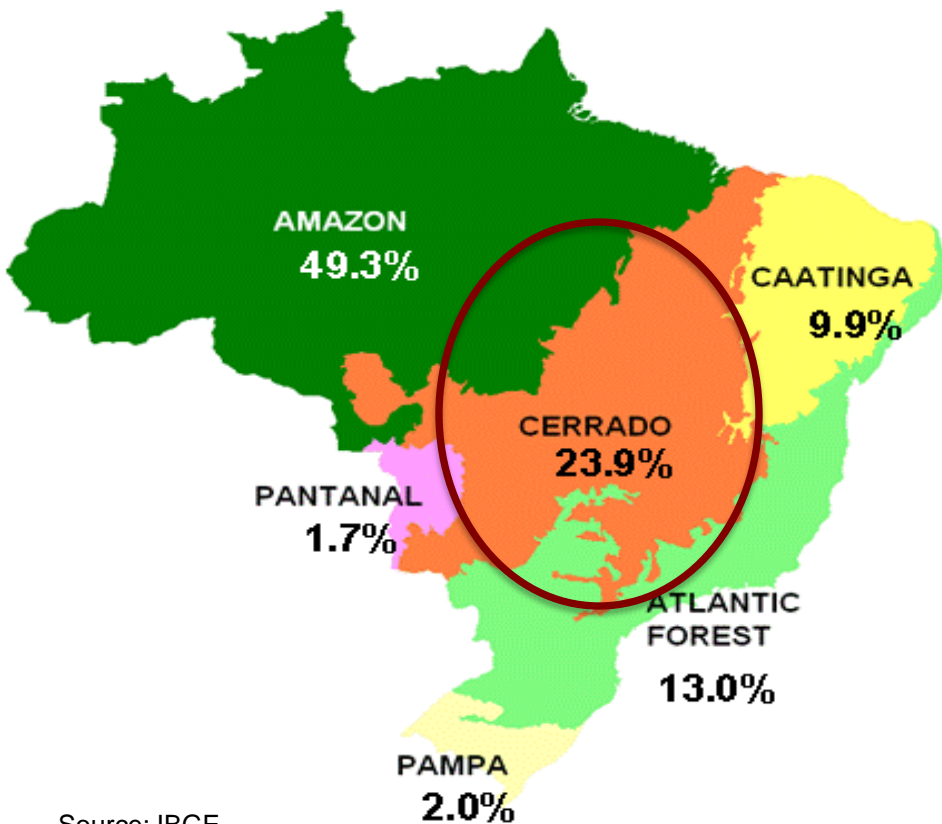


CBR/Reuters, elaborated by G.B.Martha (2009).

- Early 1970's: food supply crisis;
- Rapid displacement of the population from rural to urban areas;
 - *Cheap food x social unrest / pressures on salaries;*
- Opportunity to increase exports (keep the high rates of growth);

Brazilian Agriculture until the 1970's

- Low ag. production and low yields;
- Production concentrated in South/Southeast;
- Food supply crisis;
- Rural poverty;
- Lack of specific knowledge on tropical agriculture;
- Institutional void (ag. research, education, markets, media and governmental agencies, etc.).



Source: IBGE.

The task: to move from a traditional agriculture to one based on science & technology

Development of Agriculture in the Brazilian Cerrado



- ➔ Entrepreneurship of farmers
- ➔ Government commitment
- ➔ Availability of basic infrastructure
- ➔ Climatic conditions
- ➔ Large extension of arable lands
- ➔ Landscape suitable for mechanization
- ➔ Good physical charact. of the soils
- ➔ Availability of mineral resources (limestone and phosphate)
- ➔ **Science-based tropical agriculture**

Agricultural Production and Demand for Food

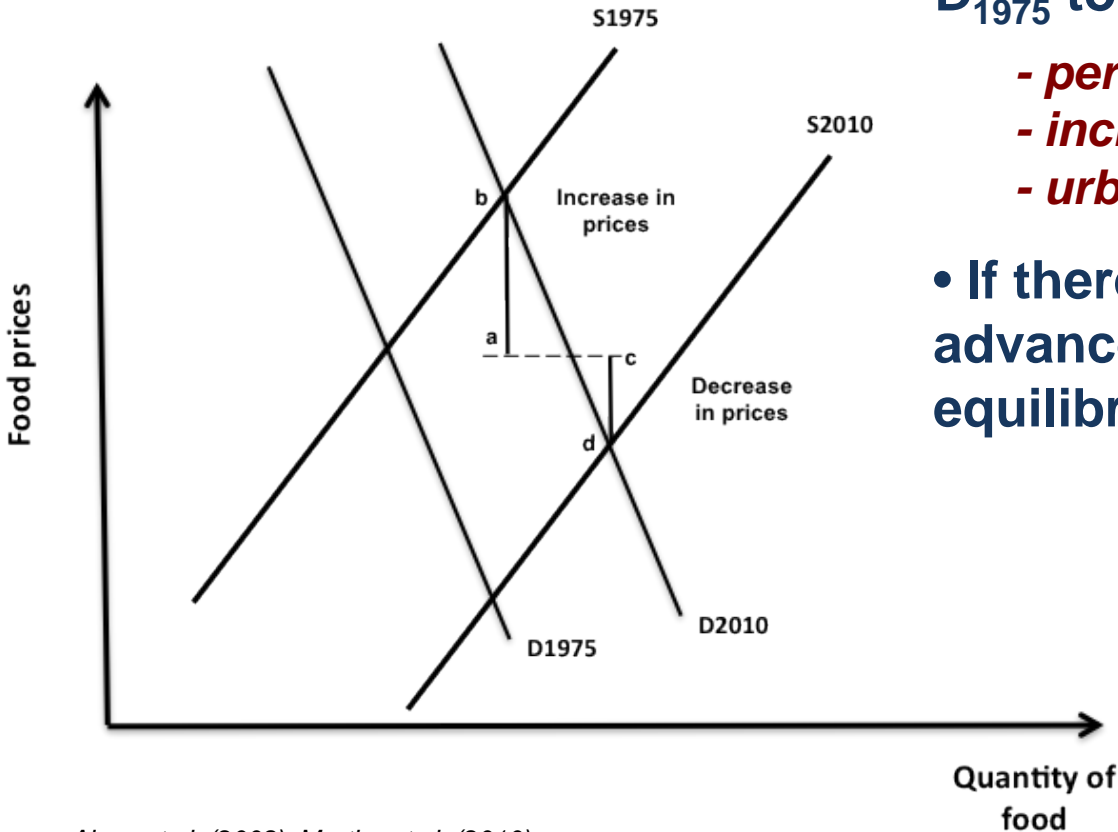
- The demand for food significantly grew from D_{1975} to D_{2010} :

- *per capita income growth;*
- *increase in population;*
- *urbanization;*

- If there had been no technological advancement during the period, the new equilibrium price would occur at point b;

- In the period, technological development on tropical agriculture spread and was consolidated throughout Brazil;

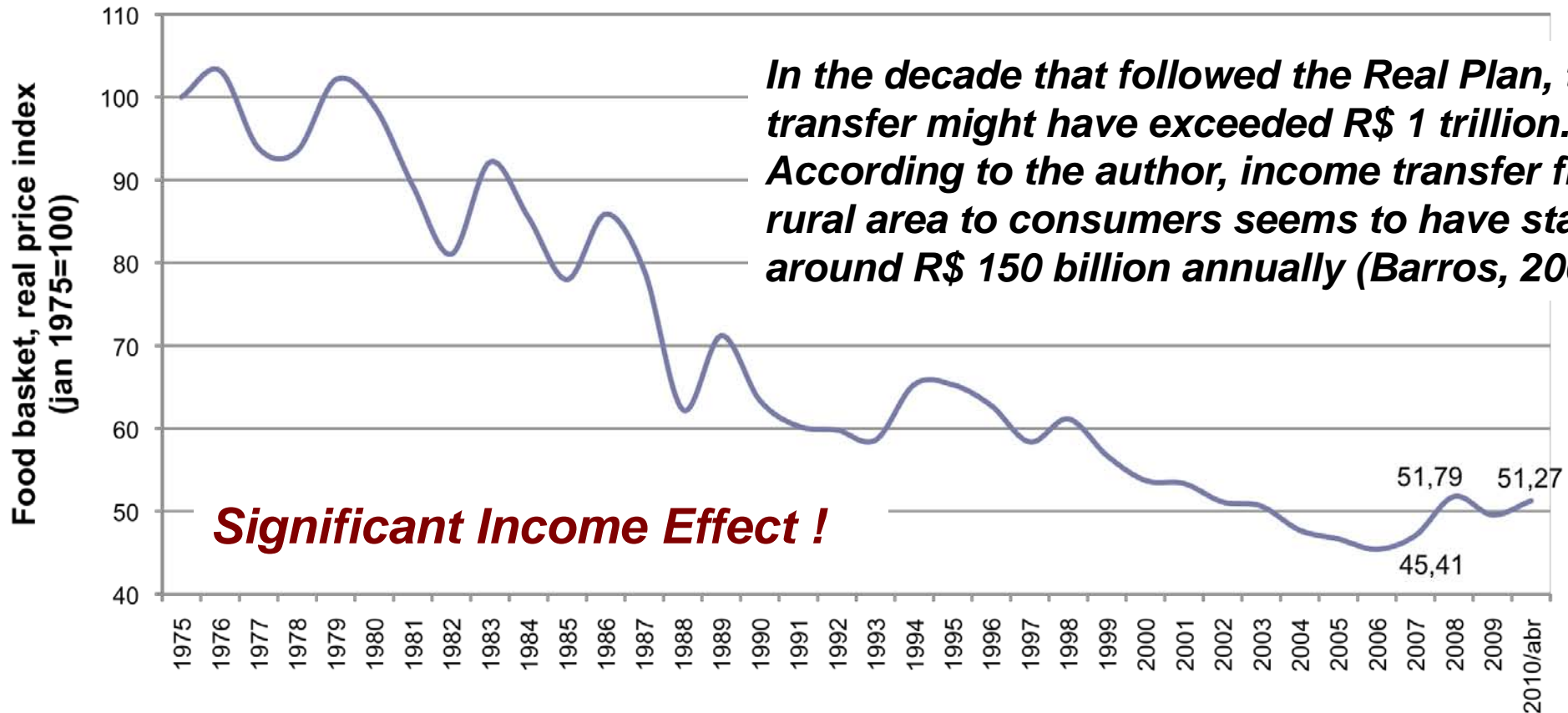
- The decrease in price was equivalent to segment $ba + cd$.



Alves et al. (2008), Martha et al. (2010).

Food Basket, Real Prices, Jan/1975-Apr/2010

Gains in consumer surplus took place partially due to lower income for Brazilian farmers.



In the decade that followed the Real Plan, this transfer might have exceeded R\$ 1 trillion. According to the author, income transfer from the rural area to consumers seems to have stabilized around R\$ 150 billion annually (Barros, 2006).

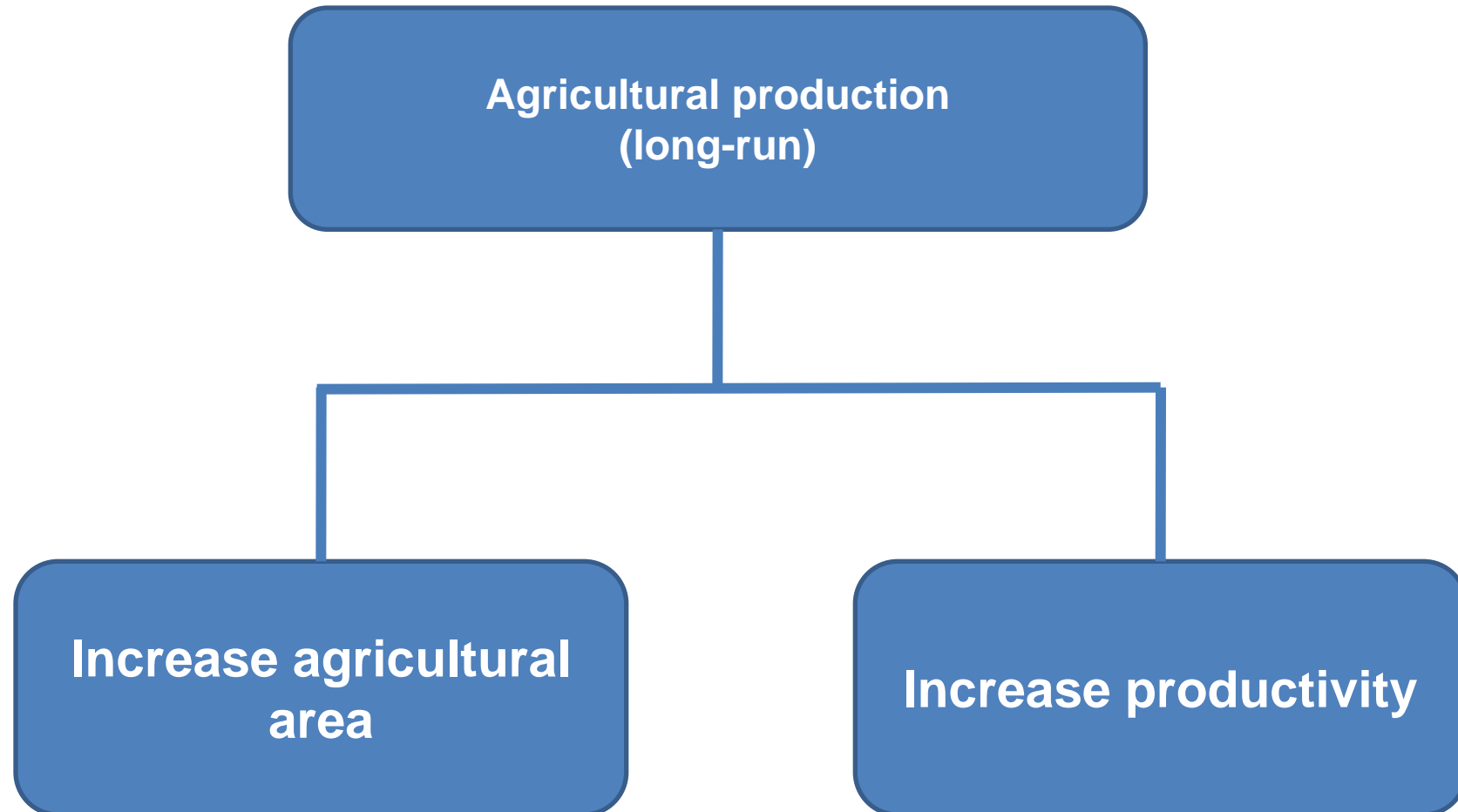
Martha Jr., data from Dieese (2010)

Guilhoto & Sesso Filho (2005):

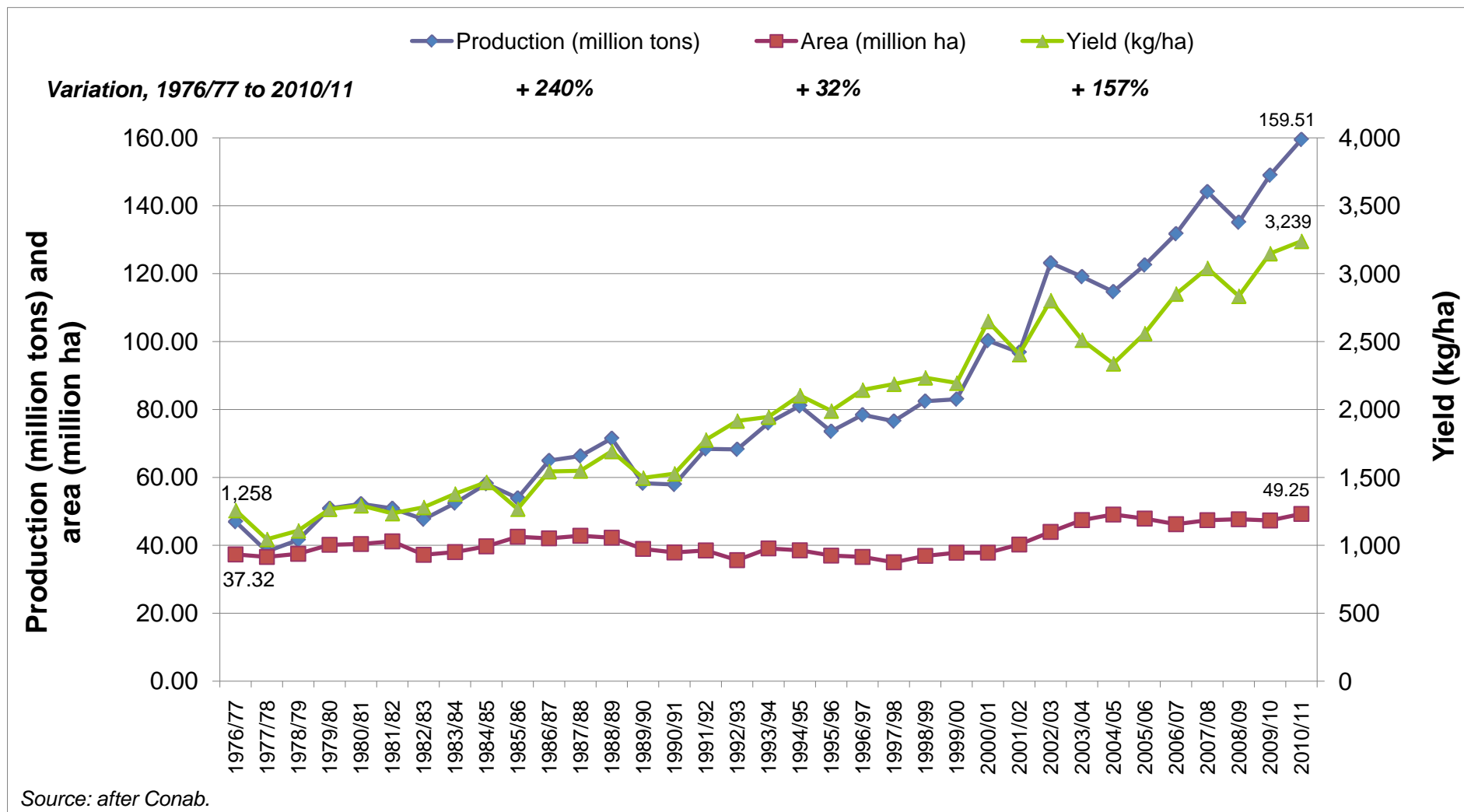
- meats, oil, sugar, soybean and corn had multipliers values from 2,28 to 2,64.
- ex.: beef processing had a multiplier of 2,57. Hence, for each R\$ 1 of increased final demand (beef processed) there will be a proportional increase in overall economy's production of R\$ 2,57.

Guilhoto (2004):

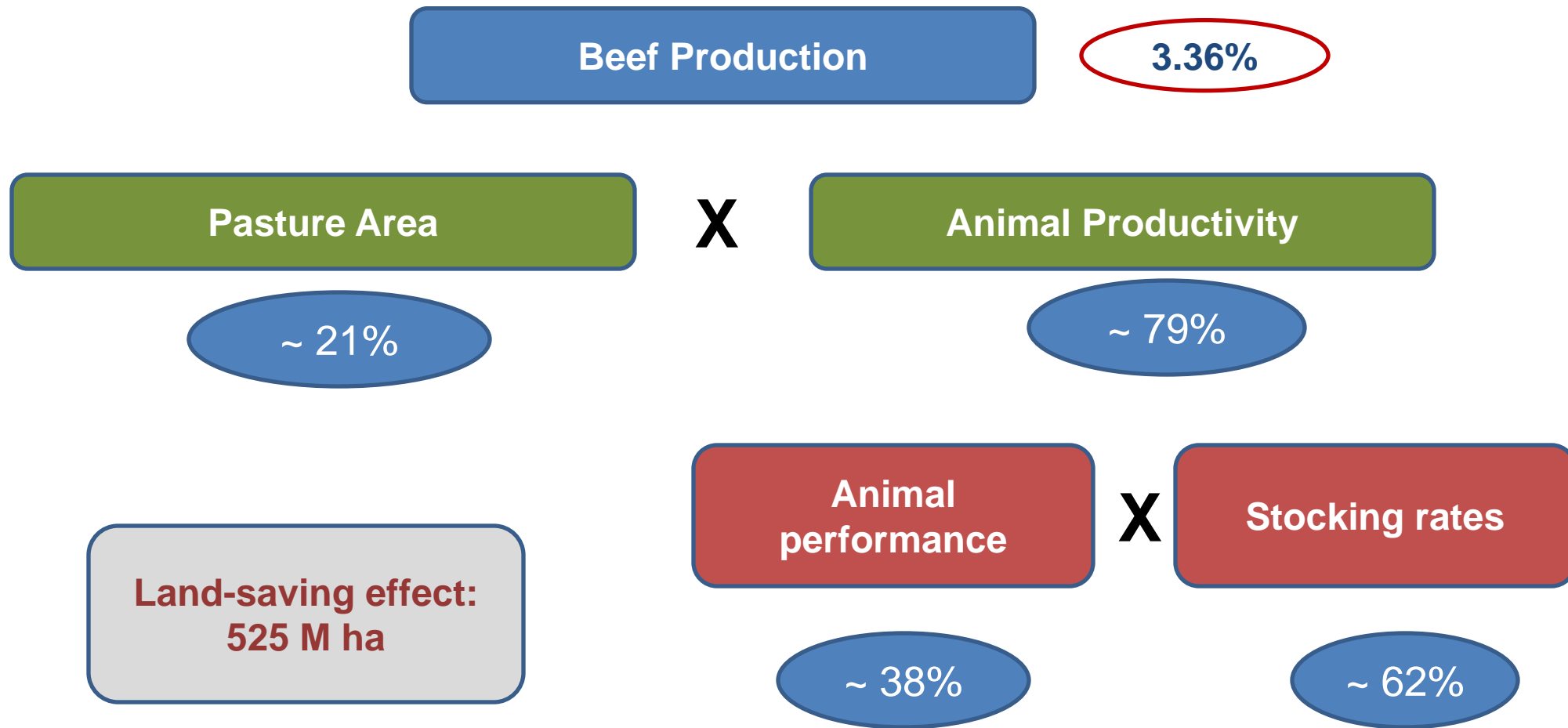
- agriculture share in GDP = 7.5%
- agribusiness share in GDP = 26,6% (multiplier power of 3,6)



Grains & Oilseeds Production, Area and Yield (1976-2011)

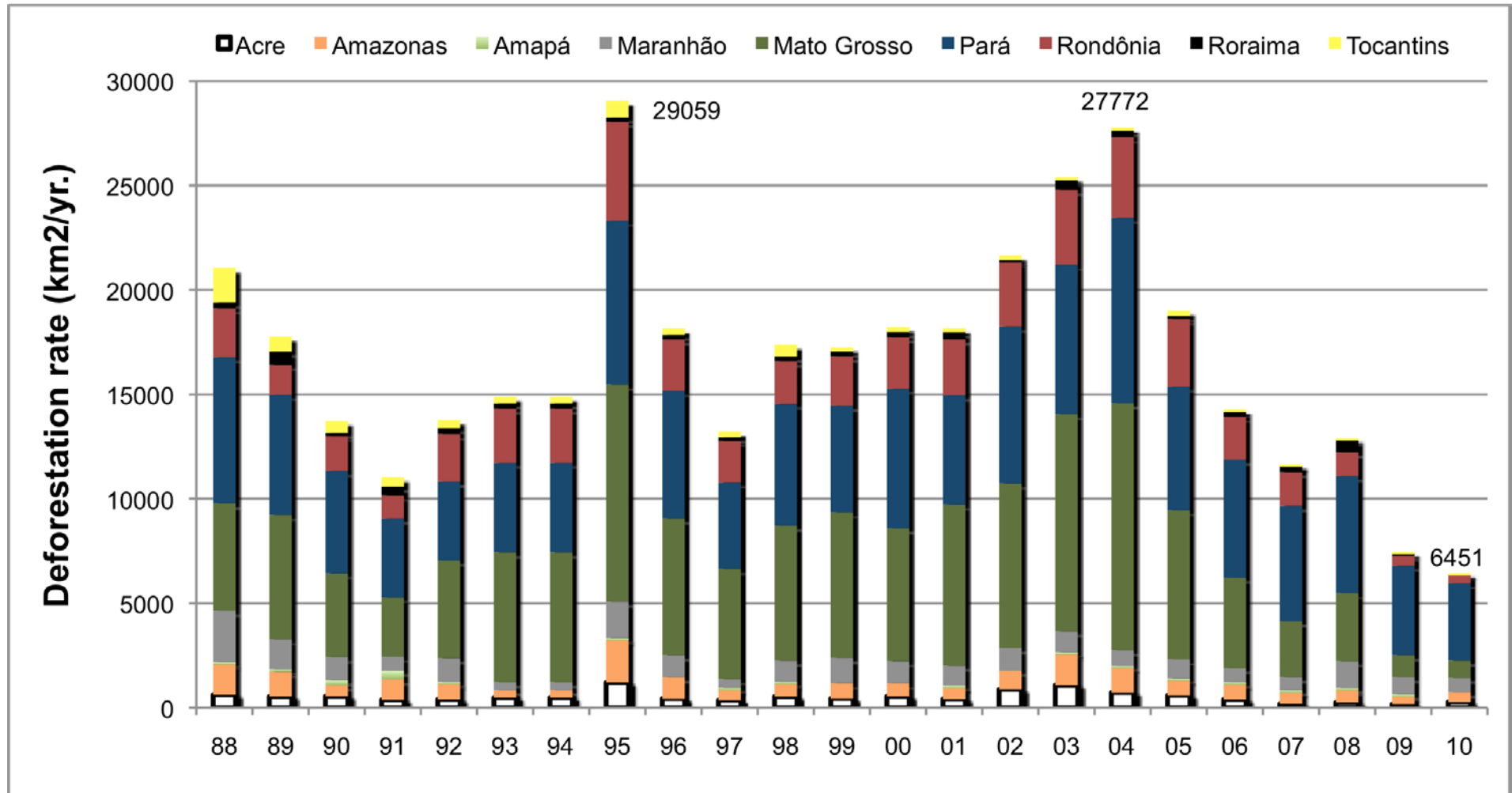


Factors of Growth in Beef Cattle Production (1950-2006)



G.B. Martha Jr., E.Alves, E.Contini (under review).

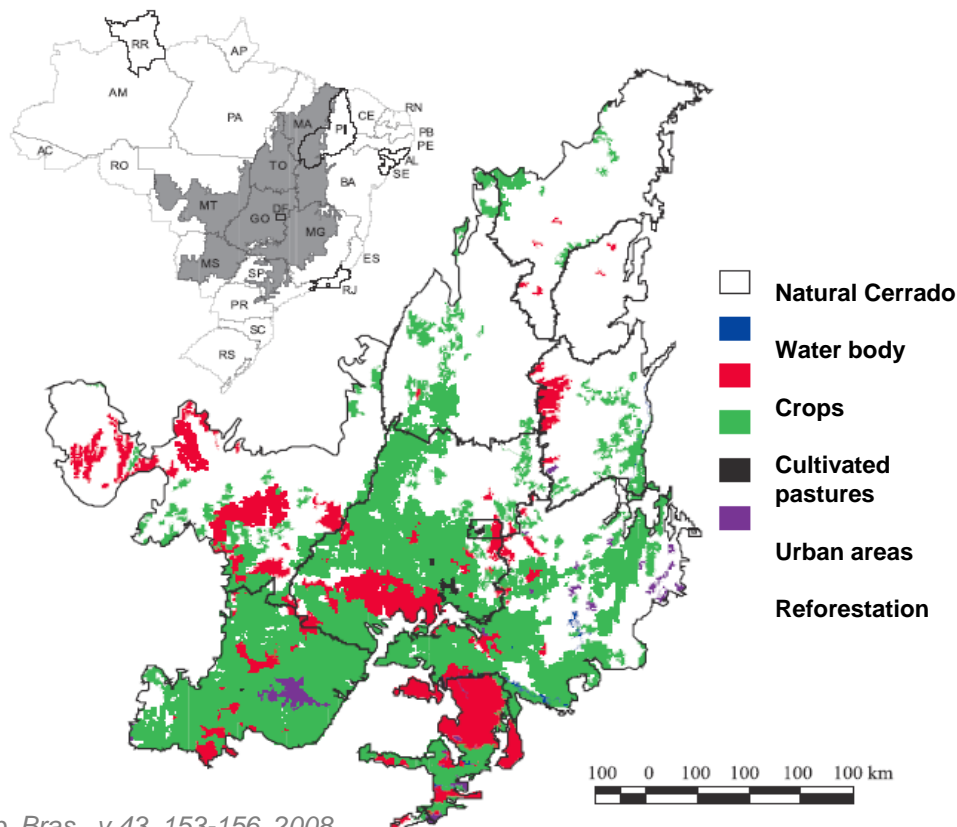
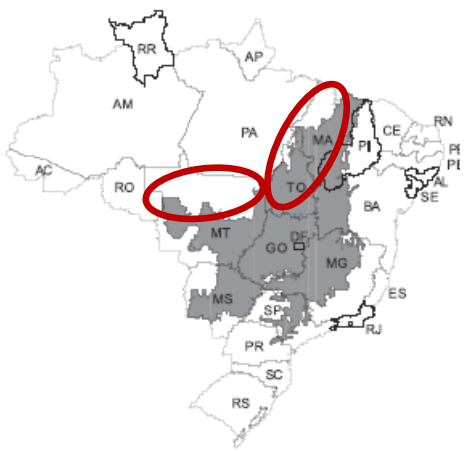
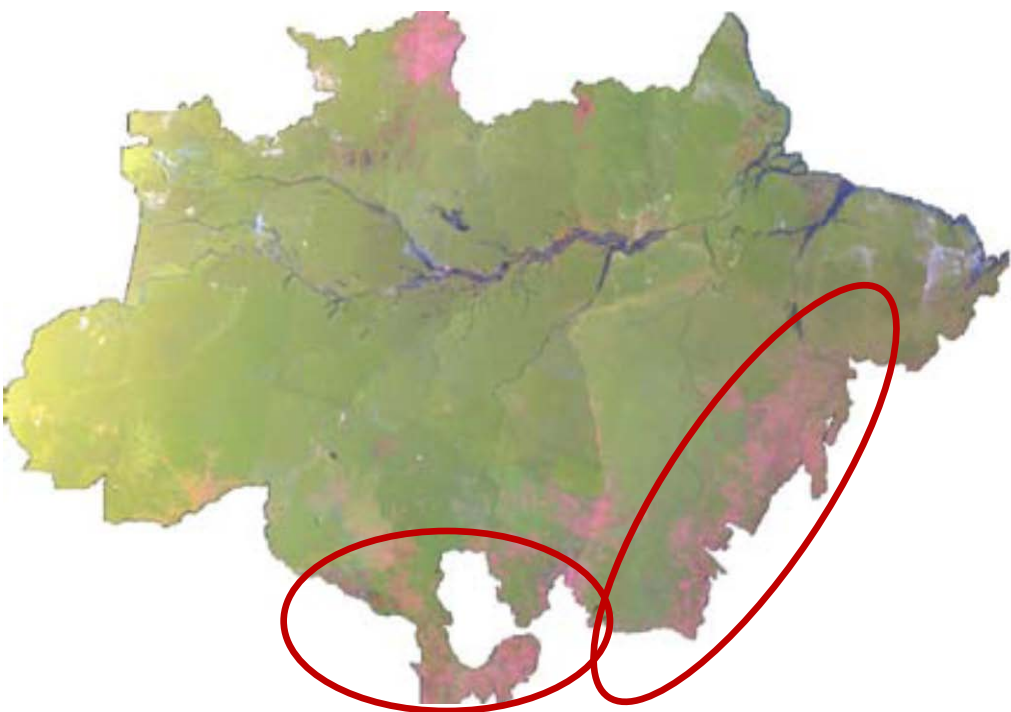
Deforestation in Legal Amazon (1988-2010)



Data from INPE.

Areas with Human Activities: Probio 2007

**90% of the Amazon Biome and
61 % of the Cerrado Biome is
still covered by the original
vegetation !**

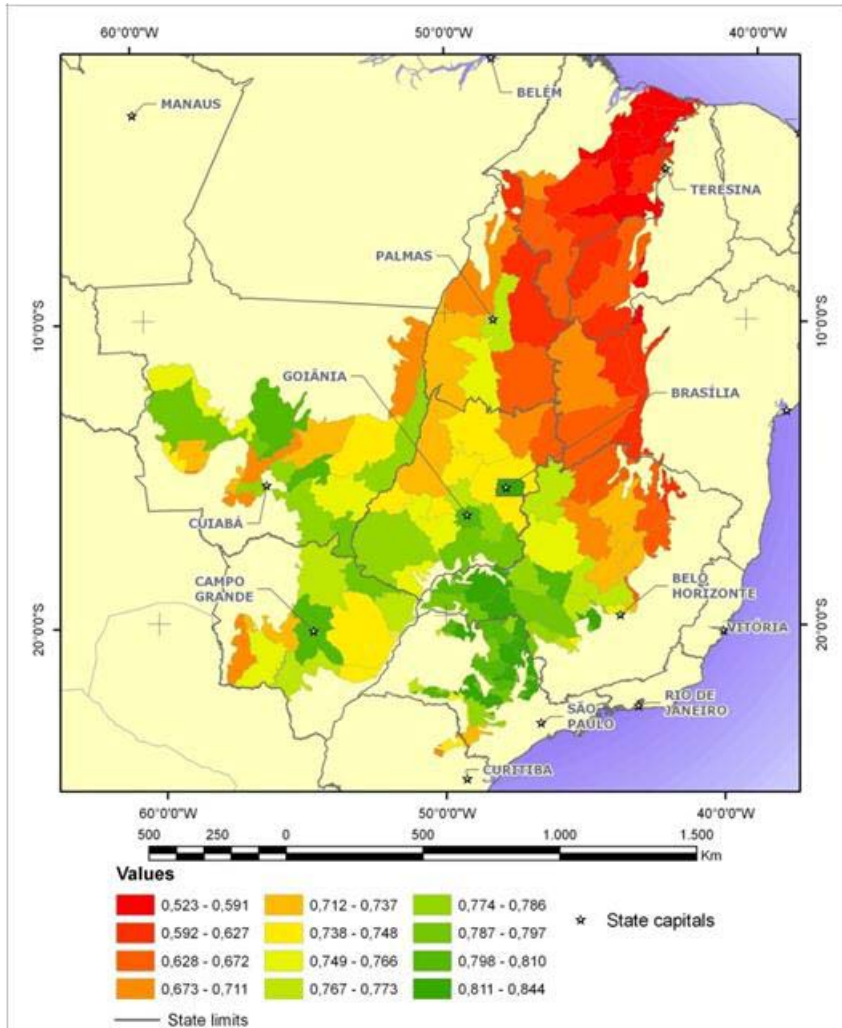


TFP in the Brazilian Agriculture, 1970 - 2006

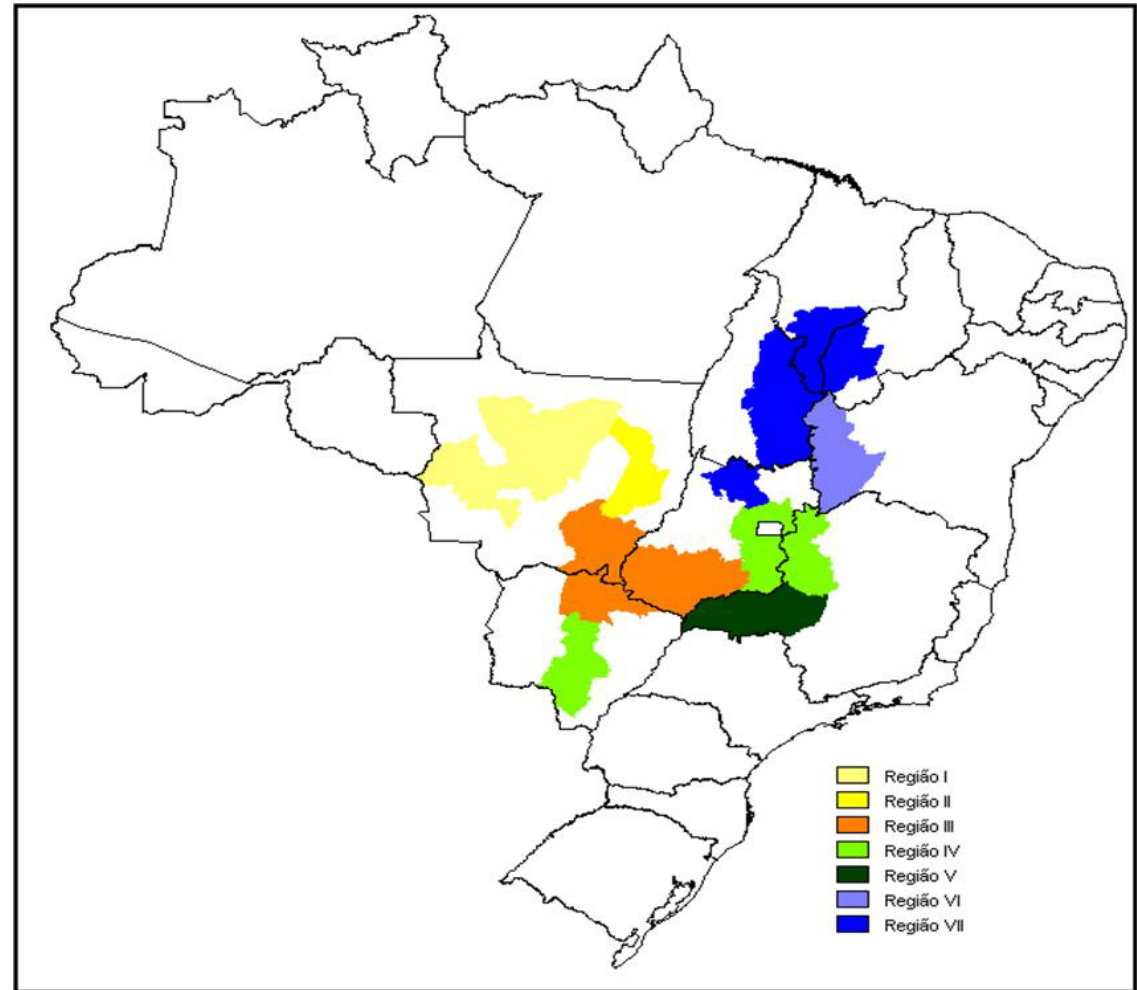
Brazil	1970	1975	1980	1985	1996	2006
Product index	100	139	173	211	244	343
Input index	100	122	142	149	137	153
TFP	100	114	122	142	178	224
Land productivity	100	135	162	196	230	324
Labor productivity	100	129	158	185	241	348

Gasques, Bastos, Bacchi, Valdes (2010).

Human Development Index and Dynamic Agricultural Regions

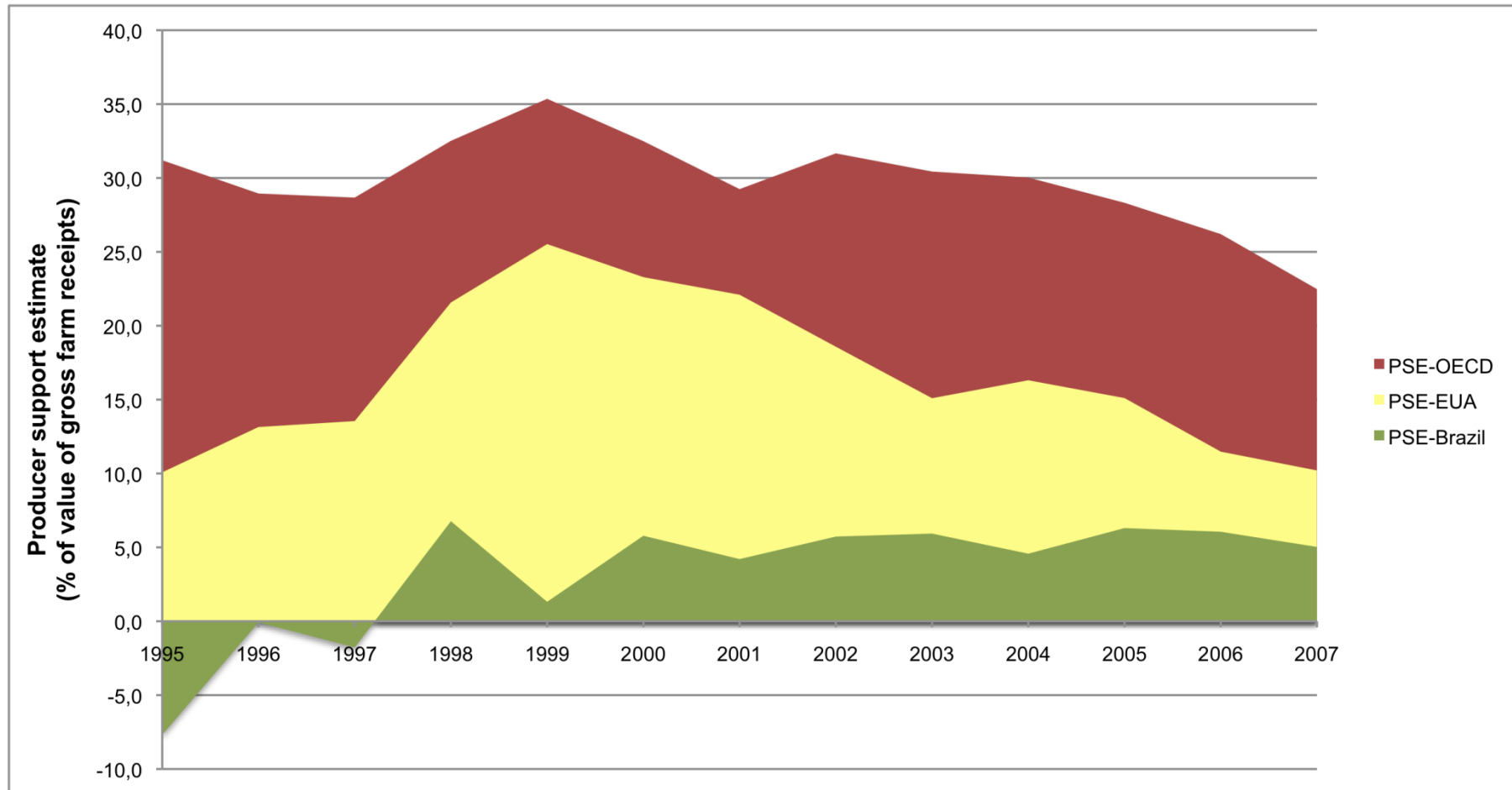


Novaes, P., unpublished.



Mueller & Martha (2008).

PSE: Brasil x EUA x OCDE



Source: OECD (2009).

Transportation System in Brazil









Area
(million km²)

Paved roads

Railways

Pipelines

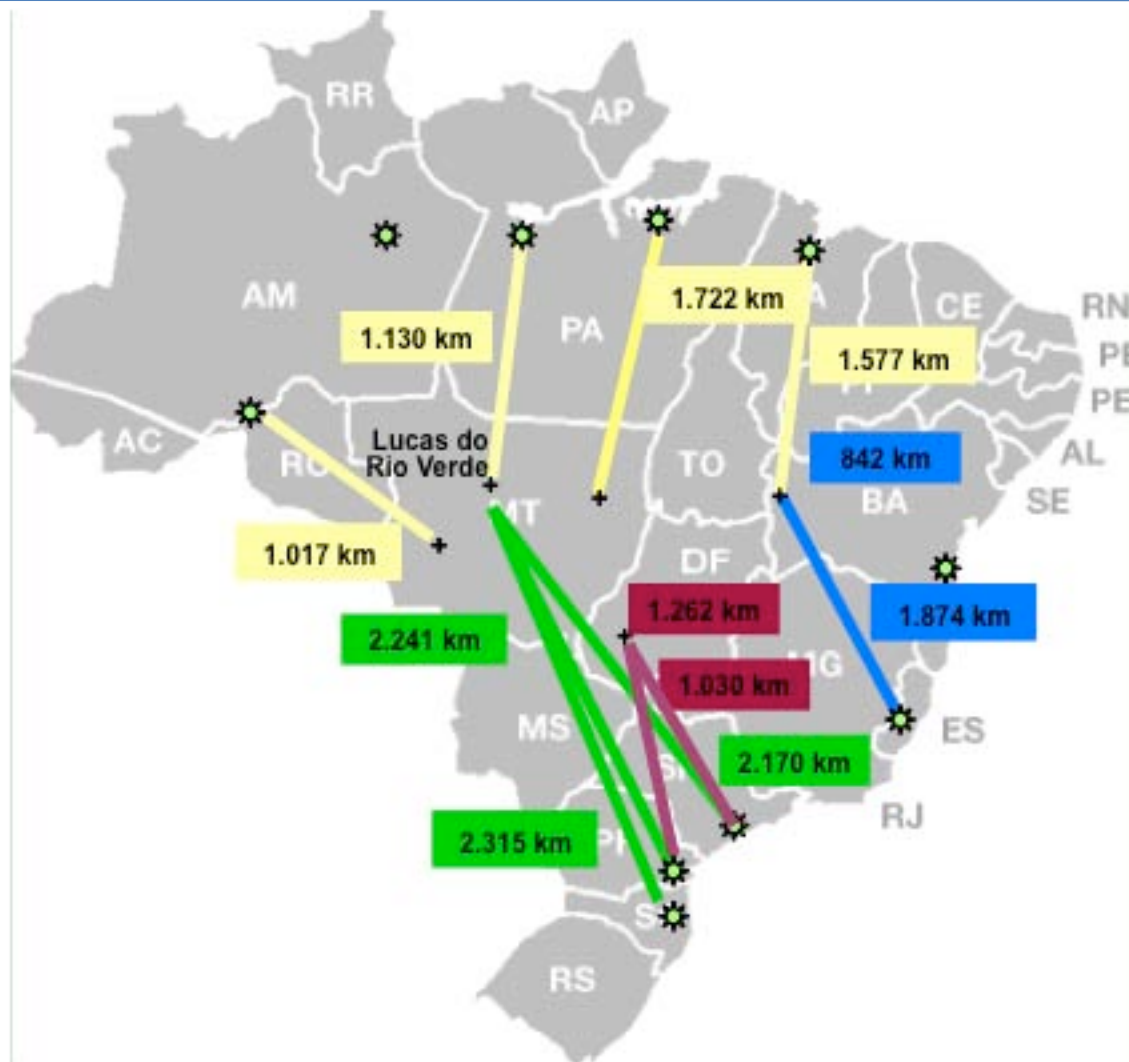
Waterways

	Area (million km ²)	Paved roads	Railways	Pipelines	Waterways
	Brasil	● 25	● 3,5	● 2,3	1,6
	China	169	● 8,3	● 6,2	● 11,8
	India	● 528	● 21,3	● 7,7	● 4,9
	Russia	44	● 5,1	● 14,5	● 6,0
	USA	460	● 24,7	● 86,6	● 4,5
	Canada	46	● 5,1	● 10,8	● 0,1

km/1000 km² of geographic area.

World Fact Book, World Bank, adapted by Souza (2009).

Distance from Production Regions to Ports



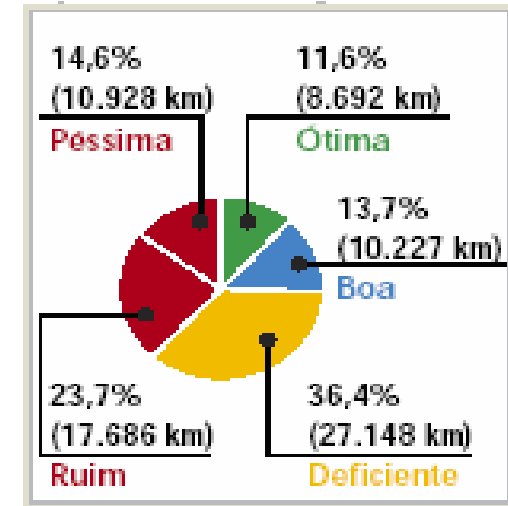
Source: Souza(2009).

Some Characteristics of the Brazilian Transportation System

	Share	Fuel Consumption	Implantation Cost	CO emission
	% total	(L/ton)	(1000 US\$/ton)	(ton/km)
Riverways	13	4	34	74
Railways	25	6	1400	104
Highways	58	15	440	219

ANTAQ, cited by Souza (2009).

Evaluation of Roads in Brazil



Pesquisa CNT (2004).

Investments in Roads

Brazilian Program for
Enhancing Growth (PAC)
+
Private Sector



PAC, cited by Souza (2009).

Investments in Railways

Brazilian Program for Enhancing Growth (PAC)
+
Private Sector

Exs.

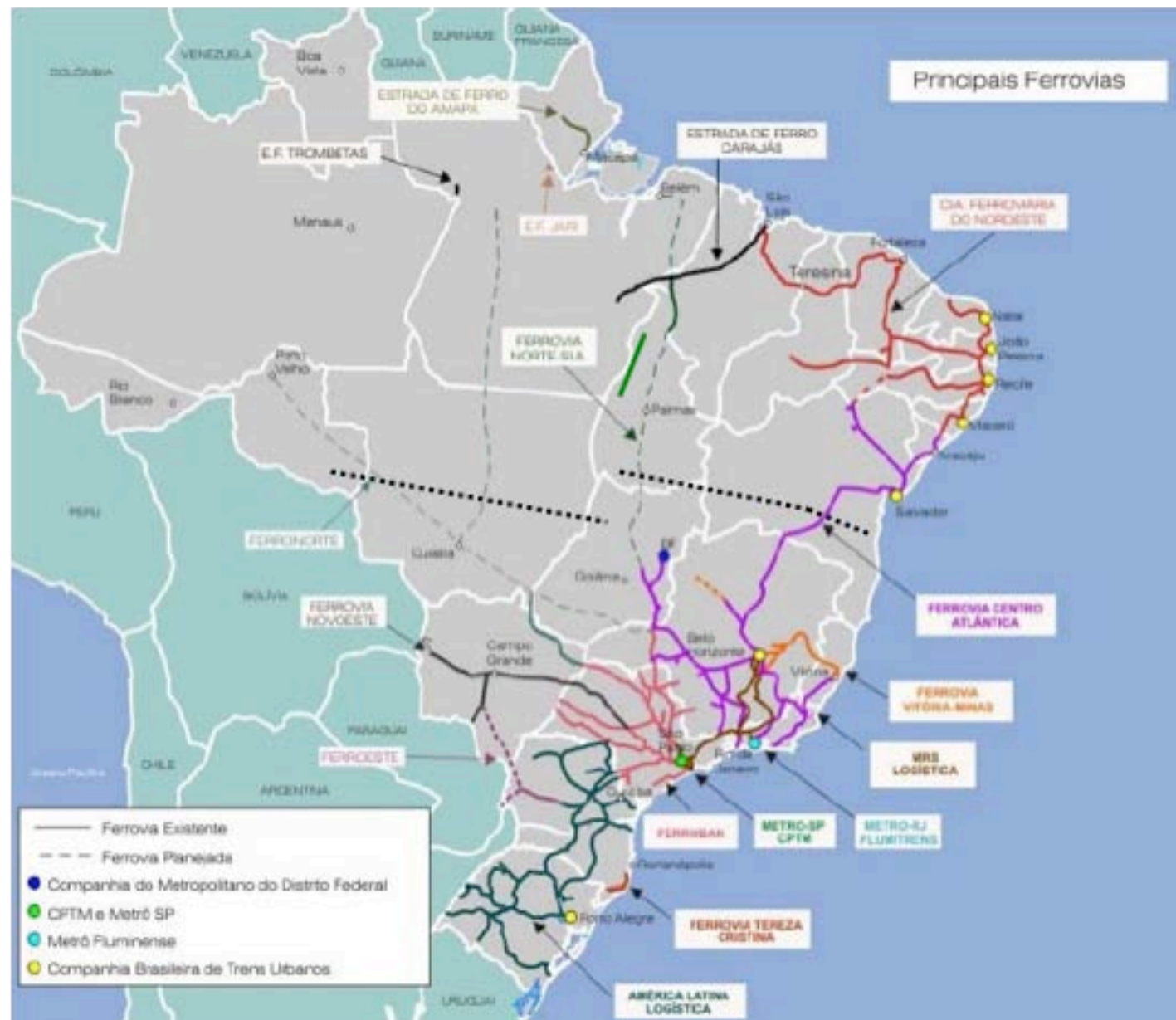
Nova Transnordestina (PI-PE)

Ferroeste (MS)

Ferronorte (RO-MT-GO)

Oeste-Leste (TO)

FNS (TO-GO-SP)



PAC, cited by Souza (2009).

Embrapa

Estudos e Capacitação

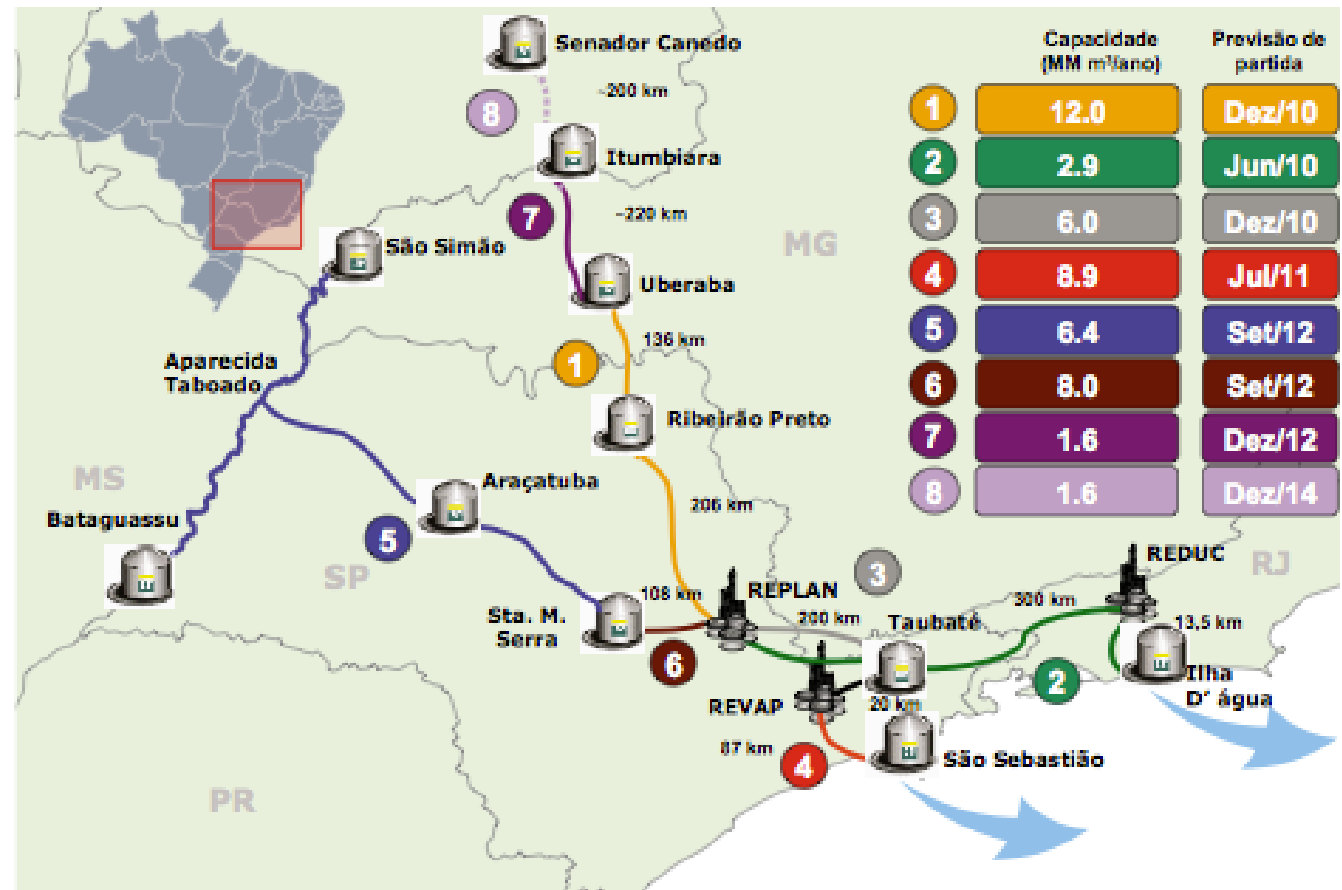
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GOVERNO FEDERAL
BRASIL
PAÍS RICO É PAÍS SEM POBREZA

Ethanol Transportation (Pipelines)

Investments in Pipelines

Brazilian Program for Enhancing Growth (PAC)
+
Private Sector



EPE (2010).



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e Abastecimento



Investments in Ports

Brazilian Program for
Enhancing Growth (PAC)
+
Private Sector

Exs.

São Francisco do Sul, Itajaí
(SC)

Rio Grande (RS)

Paranaguá (PR)

Santos (SP)

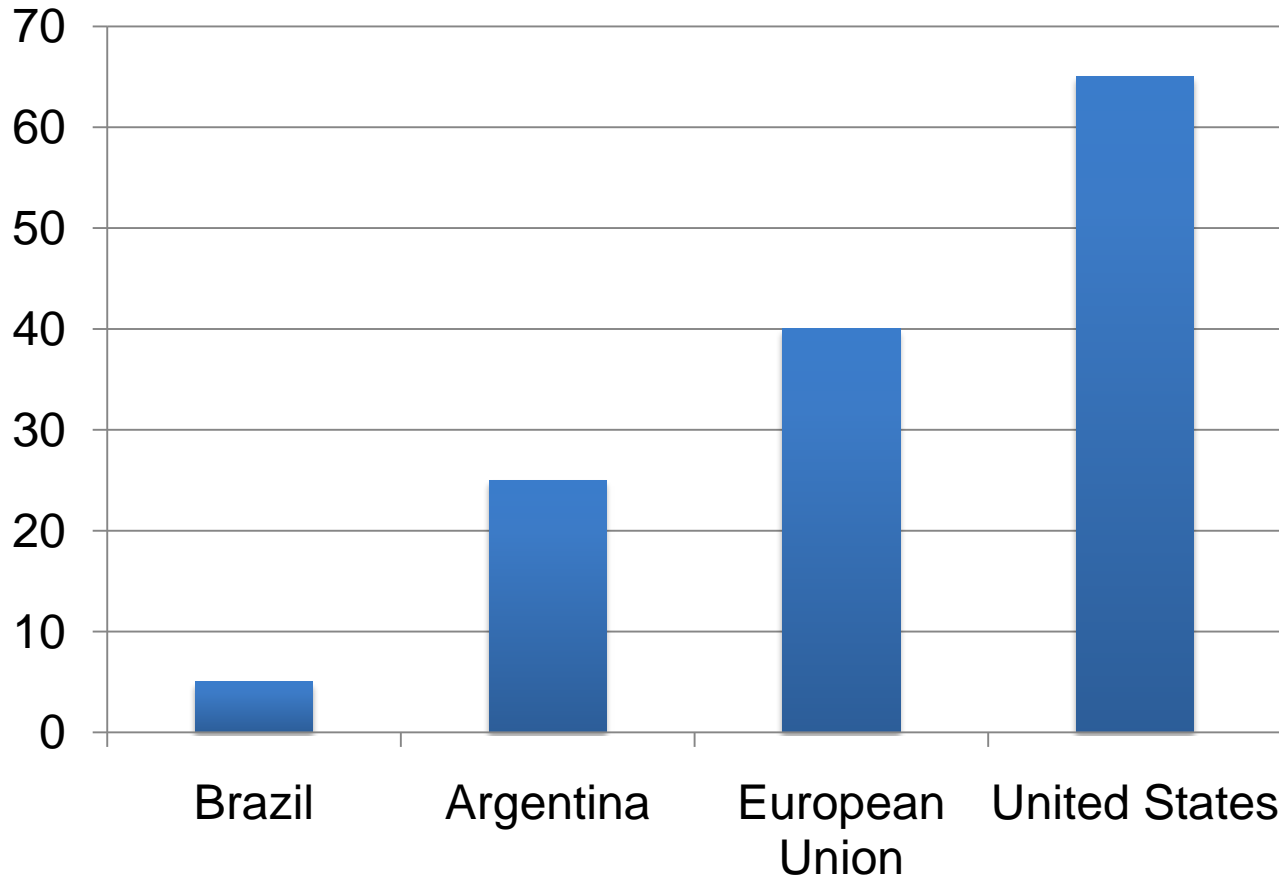
Vitória (ES)

Itaquí (MA)



PAC, cited by Souza (2009).

Storage Capacity in Farms (% total)



2010/2011 Grain & Oilseed Production

161,51 M ton (Jun/11)

Static Capacity (Official Statistics)

138,31 M ton (Jun/11)

17% gap!

Gazeta Mercantil, cited by ABAG.

Conab (2011).

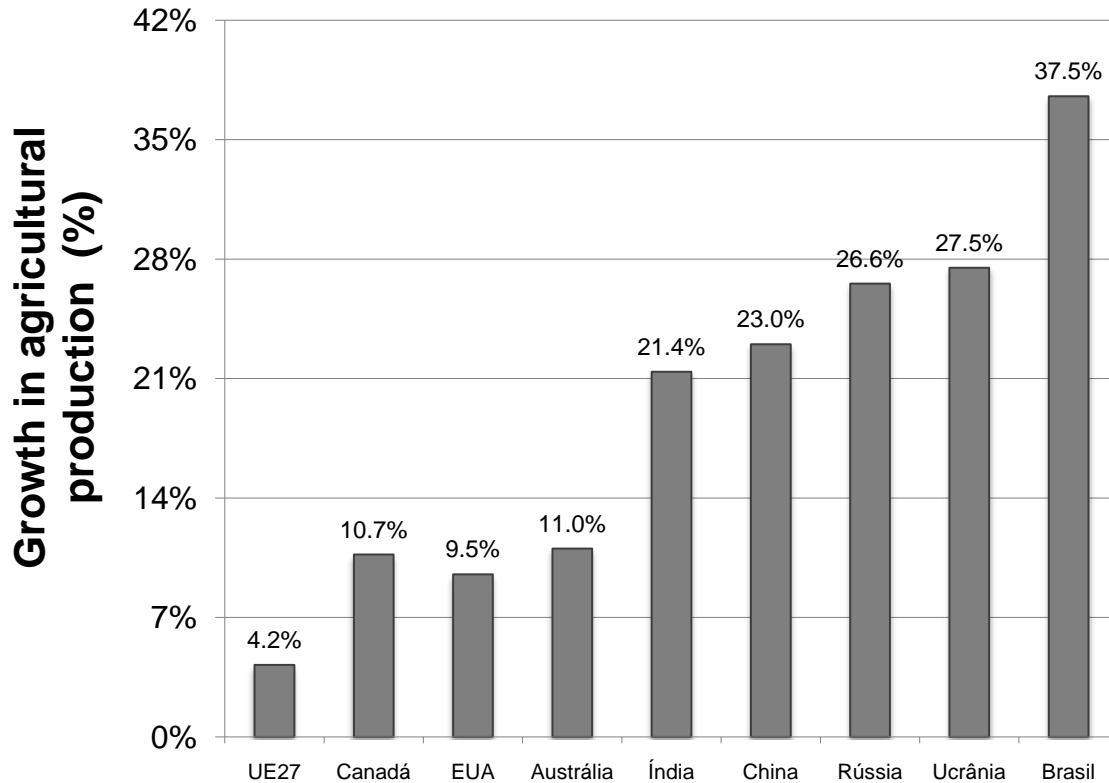
Additional Characteristics of Brazilian Infrastructure

	North	Northeast	Mid-West	Southeast	South
piped water	74%	75%	96%	98%	99%
piped water distribution nets)	69%	90%	81%	93%	85%
rudimentary sanitary infrastructure (% total)	45%	44%	56%	12%	22%
access to electricity (% total)	91%	94%	99%	100%	100%
microcomputers (share, %)	9%	10%	21%	30%	29%

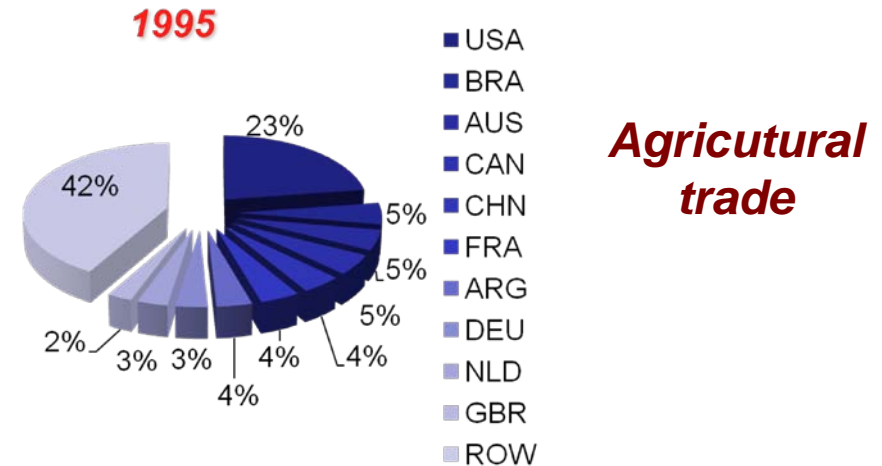
PNAD database, Pochman (2010).

Brazilian Agriculture: Future Projections

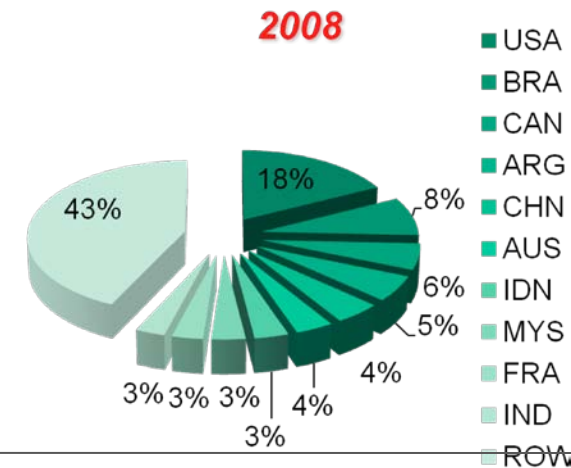
- Importance in the international scenario will increase



OECD/FAO (2010).



Agricultural trade



Liapis, after OECD (2010).



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ABC Program – Targets to 2010/2020

Resource-saving technologies (land, nutrients, water)

Action	Total Area (M ha)	GHG Emission Reductions (M t CO ₂ -e/yr.)	Est. Cost (R\$ billions)
No-till planting	8	16 a 20	2,40
Biological N fixation	5,5	16 a 20	0,30
Recovery of Degraded Pastures	15	83 a 104	19,65
Integrated Crop-Livestock Systems	4	18 a 22	34,20

Source: Brazilian Ministry of Agriculture, Livestock and Food Supply.

Integrated Crop-Livestock Systems (ICLS) Alternatives

O/N

F/M

J/J

S/O



3000 - 4500 kg/ha

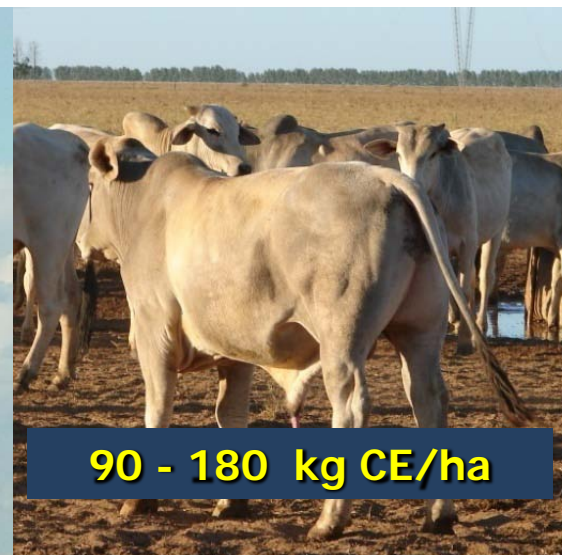


1st Crop



3000 - 6000 kg/ha

2nd Crop



90 - 180 kg CE/ha

"Cattle", 3rd crop

Activities/Time

- **The experience of Brazil's agricultural transformation is proof that it is possible to have an efficient and competitive agriculture in the tropics;**
- **The development of Brazilian agriculture was predominantly based on productivity gains;**
- **Dynamic agricultural regions have been associated with positive effects in economic growth, schooling and life expectancy ("Human Development Index" higher than 0,8);**



- **The transportation with highways amount to a total of 58% of all cargo; railways account to 25%; riverways only 13%; and on pipelines 4%. The most expensive way (highways) of transportation is the most used in Brazil;**
- **The existing channels of access from farm to ports are near exhaustion. And, even with the restoration of the main roads, the conditions of transportation in Brazil represent a definite limit for the expansion of agriculture in the near future;**



- **Public-private partnership played a very important role in the development of Brazilian agriculture. Its importance is strengthened in face of future food, energy and environmental challenges. Regarding infrastructure, the on-going public-private partnership to expand existing infrastructure is key to avoid losing competitiveness;**
- **Human capital is a major restriction to boost the production capacity of the agricultural sector, in that it requires time to be removed;**





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