GLOBAL AGRIBUSINESS FORUM

Panel 6 – Sustainable Production of Animal Protein

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On the Sustainability of Brazilian Beef Production

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Embrapa

MINISTRY OF AGRICULTURE, LIVESTOCK AND FOOD SUPPLY

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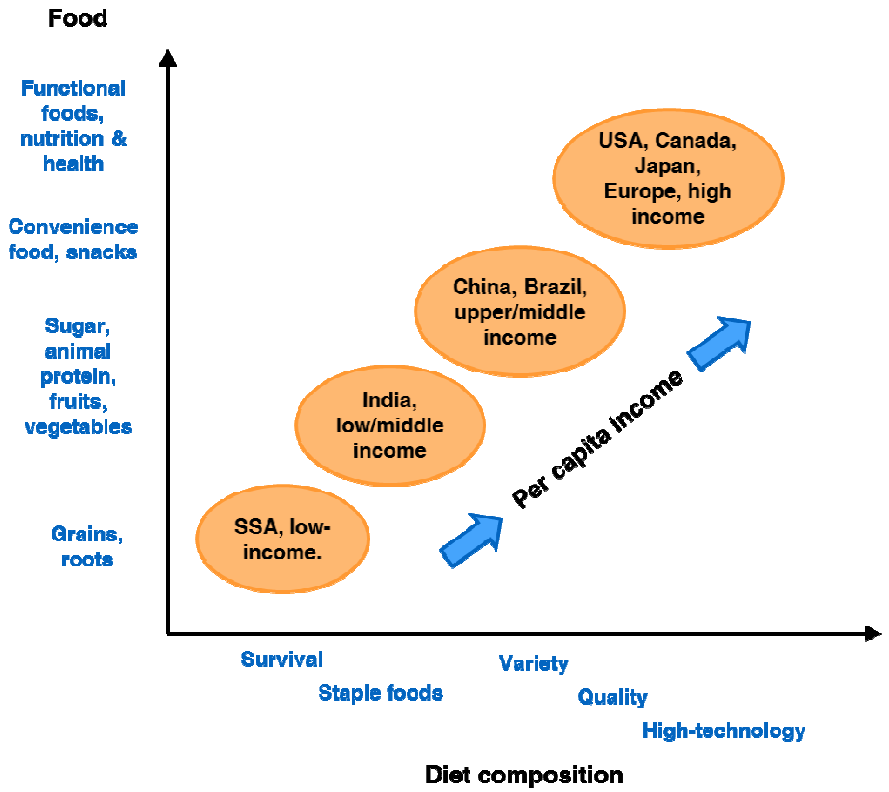
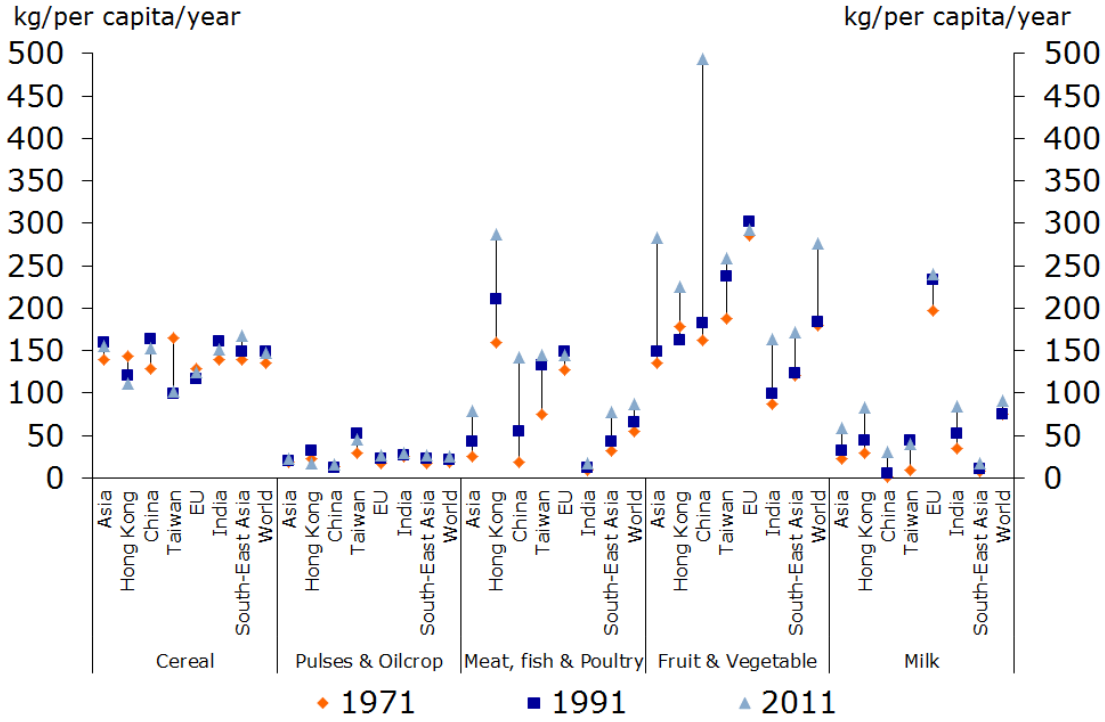
Per capita income and diet composition

The world's population will be bigger, older, more urbanized, and <u>wealthier</u> in the next decades !



Source: After Rabobank Asia (2005), Icone (2008). Elaboration: G. Martha (2016).



Source: Rabobank Asia (2016).

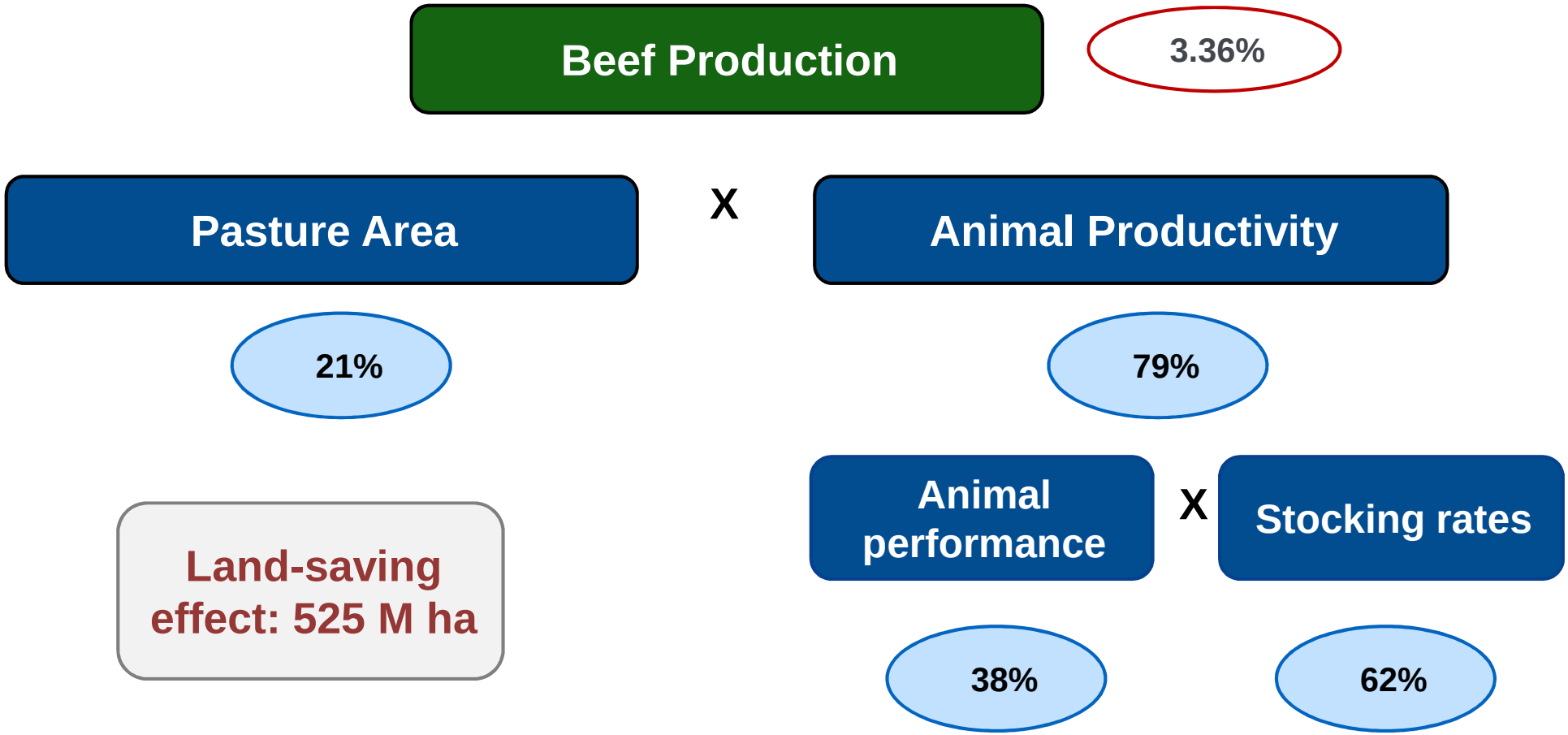
The multiple dimension of sustainability

- **It is well accepted that sustainability's dimensions – technical, economic, social and environmental – should be pursued;**

- **Sustainability dimensions' have strong interdependence linkages and, ideally, should be simultaneously met. In other words, to focus in a unique dimension will not reflect the multiple dimensions of sustainability. Agricultural production systems should design strategies that return win-win situations. When this ideal condition is not an option small loss-big gain situations should be targeted.**

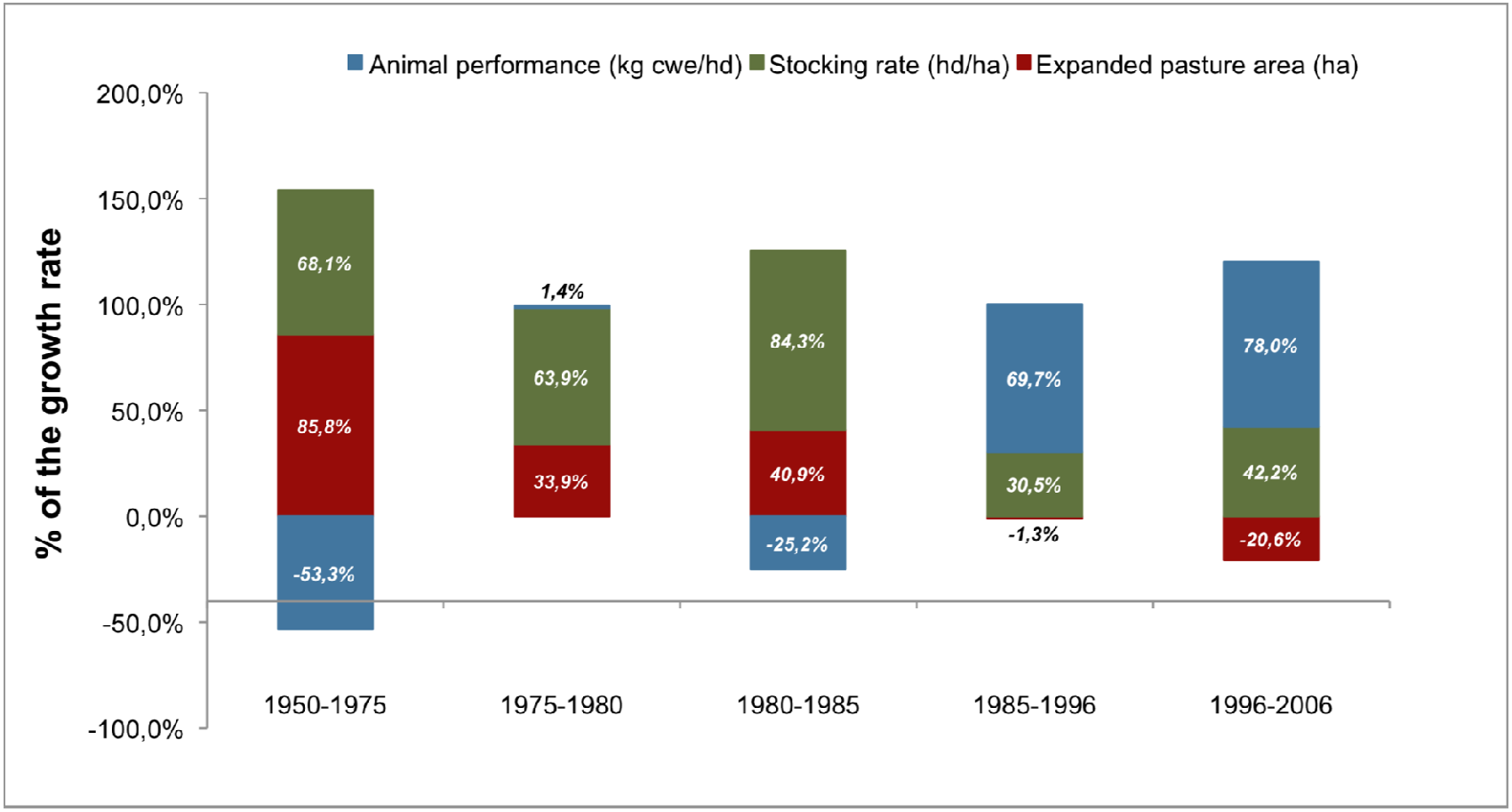
Technical-economic dimension

Factors of growth in Brazilian beef production (1950-2006)



IBGE database, Martha Jr. et al. (2012).

Factors of growth in Brazilian beef production (1950-2006)



IBGE database, Martha Jr. et al. (2012).

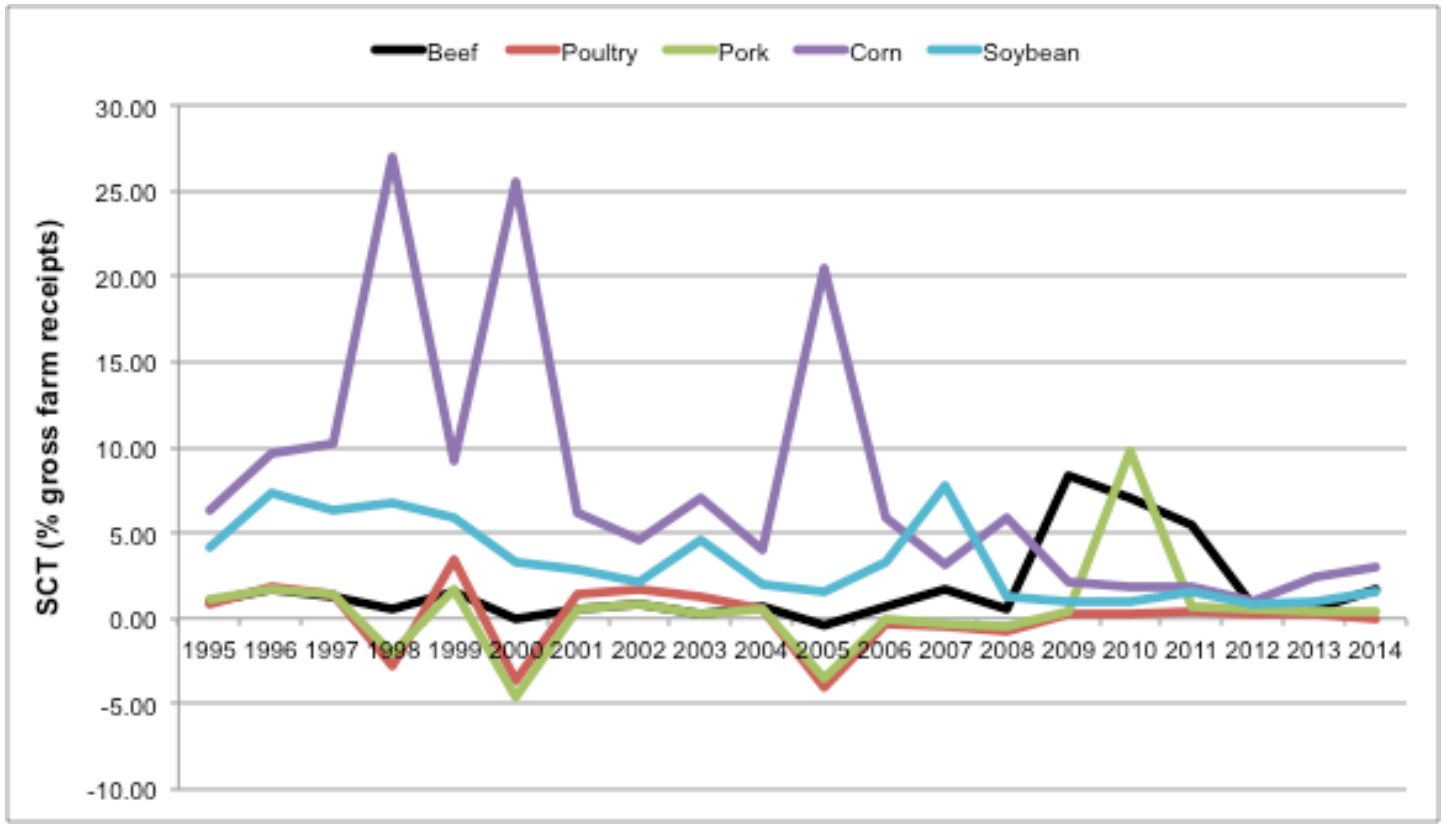
Evolution of land-productivity in Brazilian agriculture (1950 = 100)

	1950	1975	1985	1996	2006	2015
Corn	100	106	118	195	288	440
Soybean	100	206	236	311	347	404
Wheat	100	96	215	241	246	315
Rice	100	104	135	211	305	447
Beans	100	78	72	97	137	204
Sugarcane	100	160	225	231	256	275
Beef cattle*	100	107	123	227	431	**489***

* Estimate

IBGE database, Martha Jr. et al. (2012), Martha (2013). Values for 2015 based on IBGE and Conab statistics.Calculations and elaboration by G. Martha (2016).

Single commodities transfers in Brazilian agriculture – % of farm receipts



The incentives to meat production are very low. Thus, farmers will strongly respond to market signals and will adopt technologies based on individual benefit-cost analysis.

OECD database, G.B. Martha elaboration.

Environmental dimension

The huge land-saving effects arising from continued productivity gains, and the sizable reduction in deforestation rates, markedly benefited the preservation of Brazilian biomes

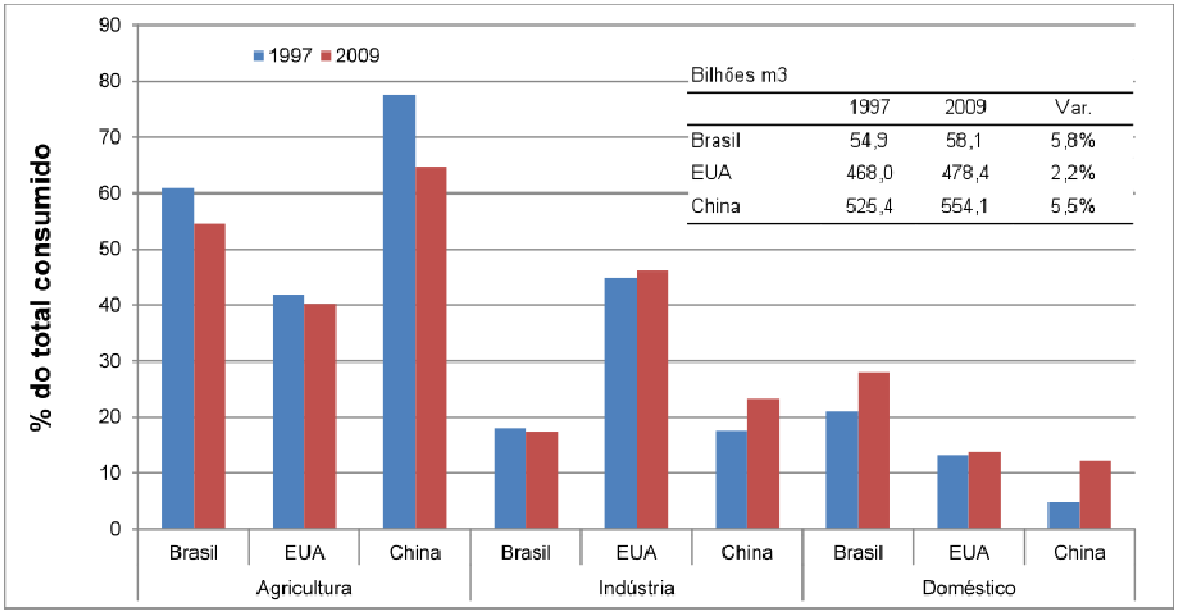
Biome	Total Area (km^2)	Area covered with native vegetation	
		km^2	% of the total
Caatinga[1]	844.453	450.938	53%
Cerrado[2]	2.036.448	1.036.552	51%
Pantanal[1]	150.355	124.945	83%
Pampa[1]	176.496	63.362	36%
Amazônia[3]	4.196.943	3.368.466	80%
Mata Atlântica[1]	1.110.182	246.460	22%
Total (Brazil)	8.514.877	5.290.724	62%

[1] - 2009; [2] - 2010; [3] - 2012.

Data from IBGE, MMA, IBAMA.

Water resources and beef production

- **Brazil holds 15.2% of the world renewable water resources**



Bilhões m3

	1997	2009	Var.
Brasil	54,9	58,1	5,8%
EUA	468,0	478,4	2,2%
China	525,4	554,1	5,5%

Data from World Bank, elaboration Geraldo Martha.

- **Green water is the water transpired by the plant that comes from water stored in soil**

	Green	Blue	Gray
fruits	75%	15%	9%
cereals	75%	14%	11%
oilseeds	86%	9%	5%
milk	85%	8%	7%
chicken	82%	7%	11%
pork	82%	8%	10%
beef	94%	4%	3%

Hoekstra & Chapagain (2008).

98% in Brazil

- **What is the comparative water balance in a given landscape (native v. agric. system) ?**

X

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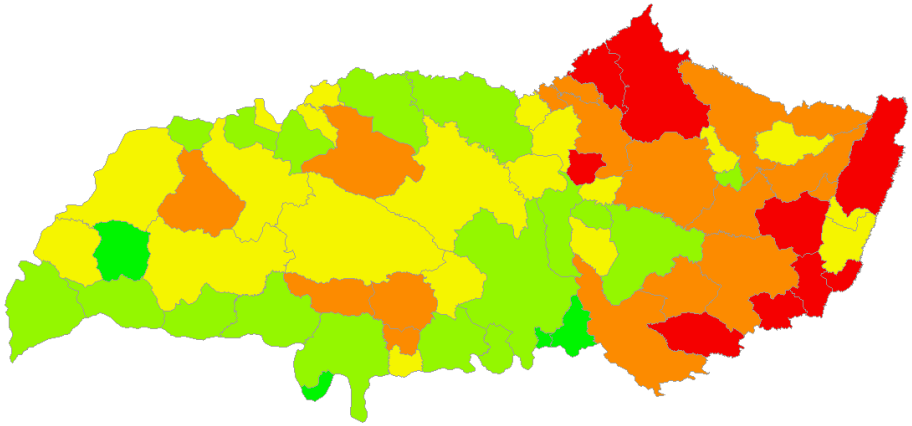
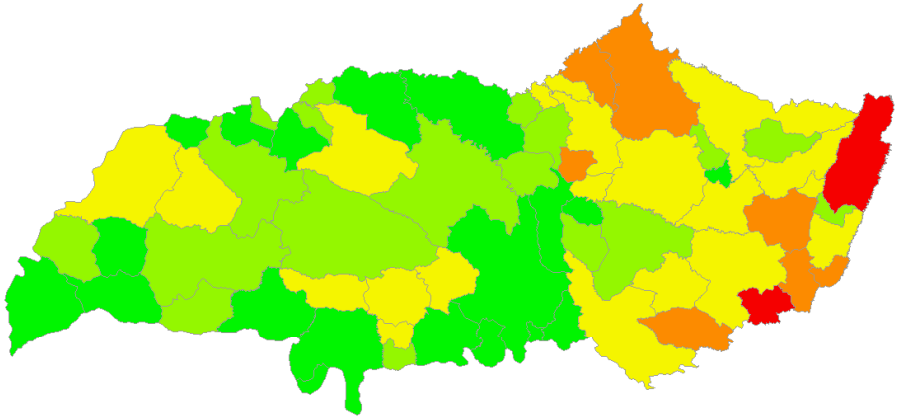
Productivity x net GHG emissions

Carbon sequestration by tropical pastures is potentially enormous. In many cases, GHG emissions can be completely balanced in these systems. Increasing productivity potentially reduces the intensity of GHG emissions and leads to increased carbon sequestration (right graph).



HL_Net emissions (CO2-eq, kg/ha)

- < -2000
- - 2000 - -1500
- - 1500 - -1000
- - 1000 - -500
- > - 500



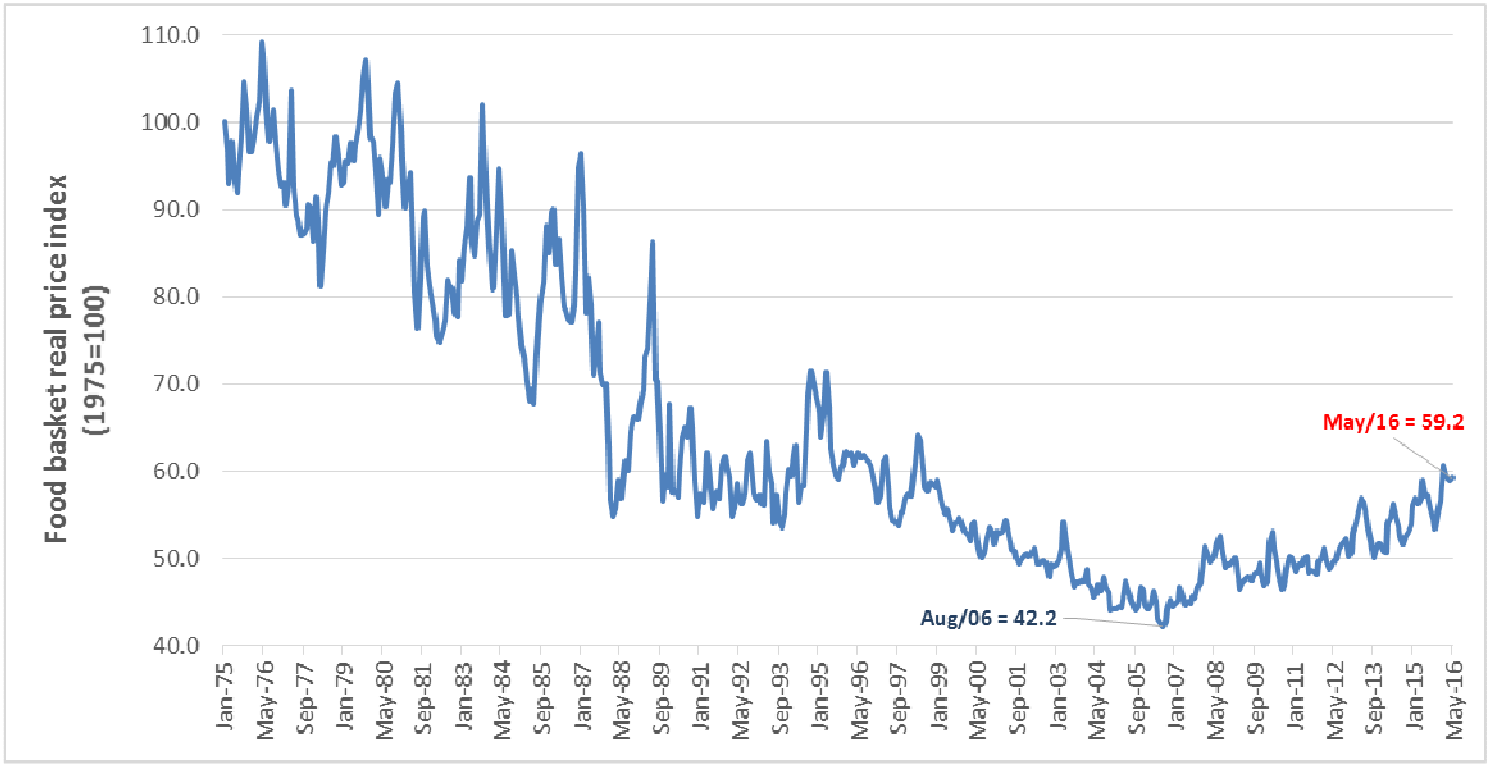
HH_Net emissions (CO2-eq, kg/ha)

- < -2000
- - 2000 - -1500
- - 1500 - -1000
- - 1000 - -500
- > - 500

GHG emissions and C sequestration estimates based on results from Barioni et al. (2009), Urquiaga et al. (1995), Corsi et al. (2001). G.B.Martha & M.P.Gomes (work-in-progress; in review).

Social dimension

Social impacts of agricultural technologies (real food prices to consumers)



The huge growth in Brazilian agricultural production resulted in reduced prices to consumer. This alleviated inflationary pressures and generated an "income-effect" that benefited mostly the poor.

Prices for SP-Brazil. Data from Dieese (2016), The inflation deflator is the IGP-DI (May 2106). Calculations and elaboration by G.Martha,

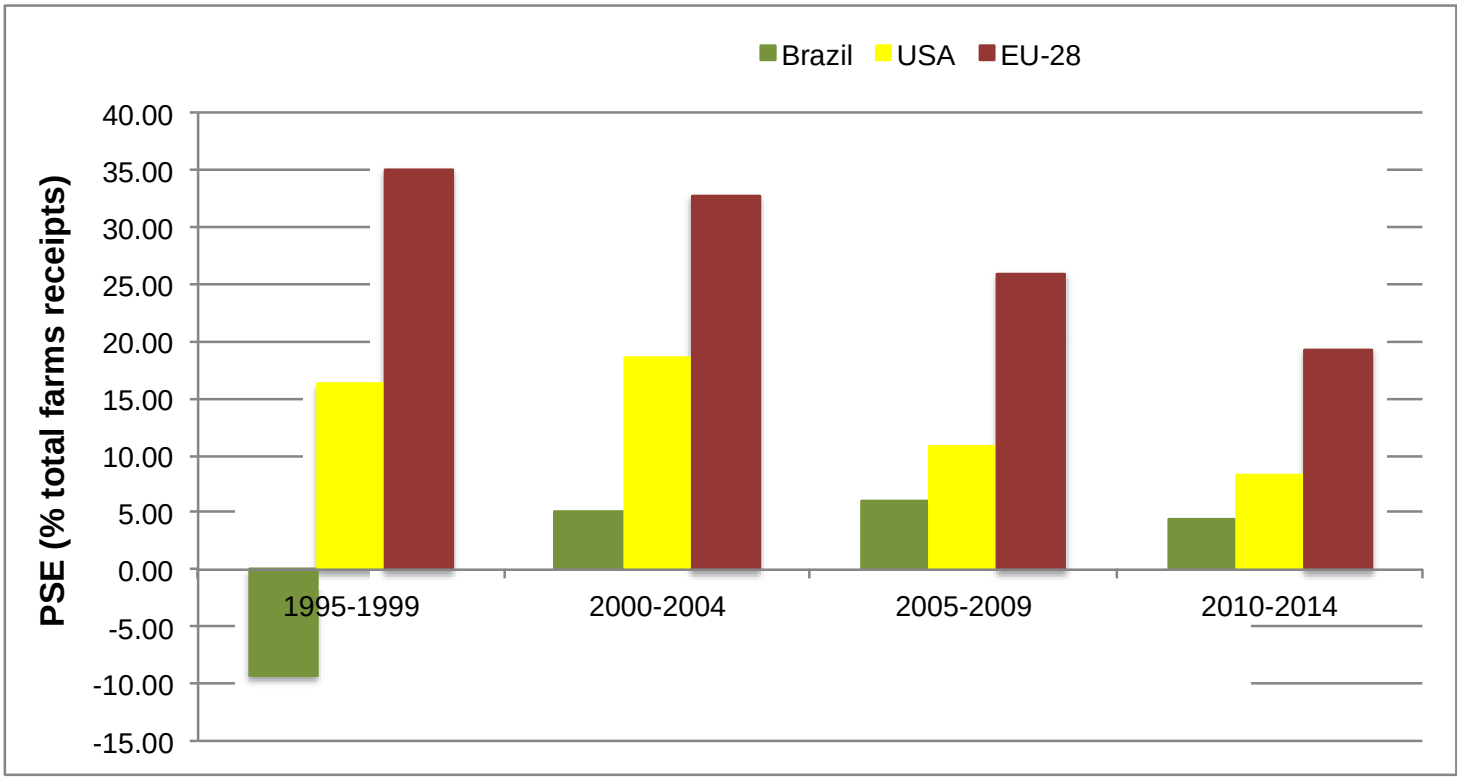
“Human capital” in Brazilian livestock sector

	1996	2010	Change (%/yr.)
illiterate	35.06	18.67	-4.4%
elementary school level	26.79	18.51	-2.6%
from 6 up to 9 yrs of schooling	17.75	34.14	4.8%
from 10 up to 12 yrs of schooling	5.61	21.63	10.1%
> 12 yrs of schooling	2.4	3.13	1.9%

Data from RAIS/MTE. Calculations and elaboration by G.B.Martha.

- **Schooling / training v. technology adoption;**
- **Schooling / training v. salary pressures and automation demand;**

Incentives to agricultural production in Brazil: PSE – % of farm receipts



Data from OECD (2015). Elaboration: G.Martha.

The incentives to Brazilian agriculture have been low compared to other major players. The PSE to Brazilian farmers averaged 1.6% of the total farm receipts from 1995-2014. The corresponding values to the US' and Europe's farmers were 13.5% and 28.3%, respectively.

Concluding remarks

Two-cents of thoughts:

- **Facing the facts**: "*Blueprints for Utopia are available in abundance. What are not nearly so abundant are prerequisites for rational thinking about current problems and future alternatives. The most important of these prerequisites is the truth.*"

(Thomas Sowell, 2015)

- *There are clear opportunities to expand agricultural production, for food and non-food purposes, in a sustainable way in Brazil. Intensifying pastoral systems will be of central importance (v. costs).*

Two-cents of thoughts:

- *Successful scaling-up depends upon multi-stakeholder approaches. Knowledge exchange, capacity development, technology transfer and well-functioning input and market chains are key-components to foster the adoption of sustainable technologies.*

- *Increasing production with more efficient use of resources will necessary encompass expanded investments in human capital. Furthermore, it is necessary to recognize that no Organization or even country has all the solutions needed to fully and adequately responds to the challenges and opportunities ahead. Thus, Brazilian agricultural R&D Organizations must strengthen partnerships and alliances within and beyond the country's borders.*

Embrapa Labex-USA

The solely form of forecasting the future is to build it !

(Antonio Delfim Netto, May 2012)



Thank You !

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