Allocating greenhouse gas emissions from land conversion

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Presentation outline

- Introduction: *GHG emissions from LUC*
- Methods: *existing method & alternatives*
- Results: *using new method*
- Discussion
- Conclusion

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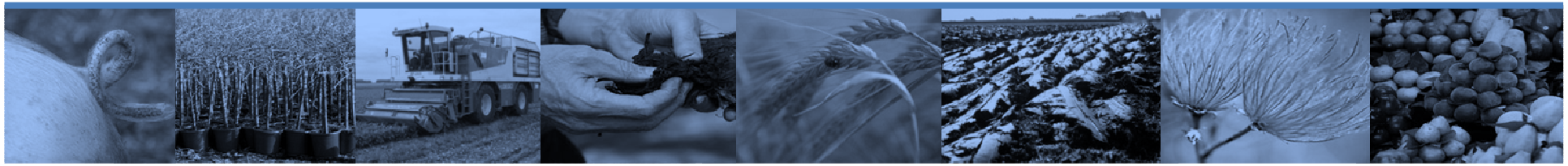
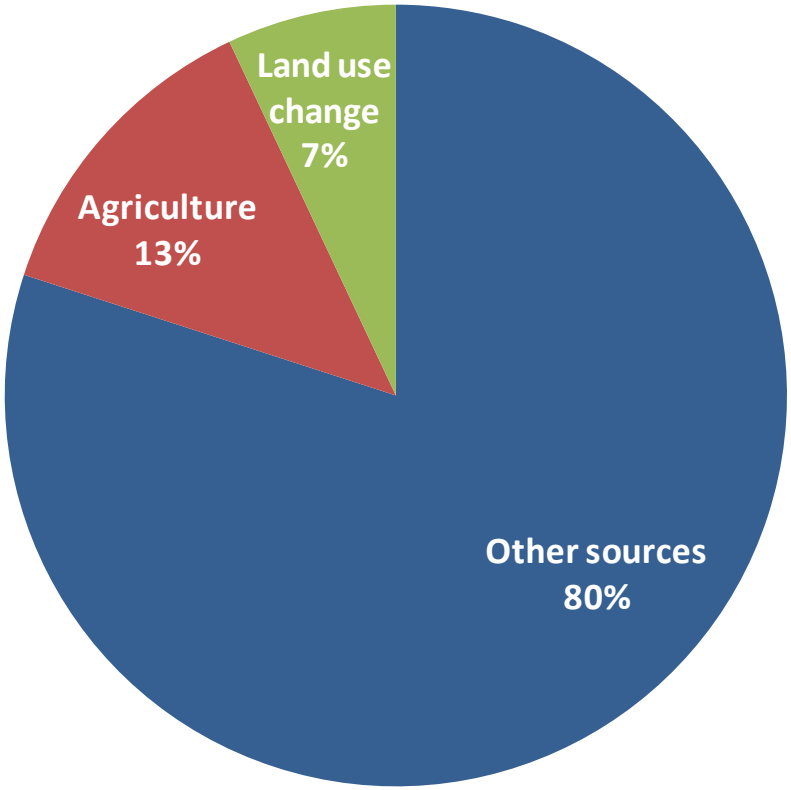


Global GHG emissions



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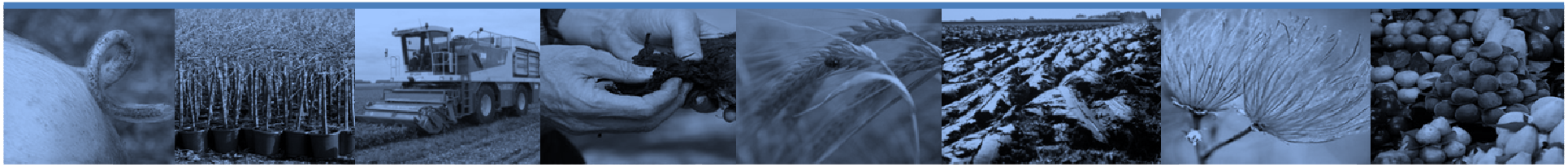

Greenhouse gas emissions

500 kg CO_2eq per hectare

from burning and decay of Brazilian forest

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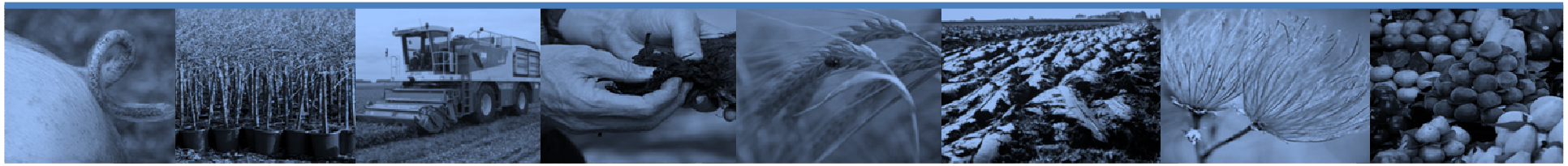

Direct land use change method

- Was your land converted **in the past 20 years**?
- Don't know = yes!
- 1/20th to all agricultural activities in the first 20 years (why not 100 years?)
- So, you should leave **recently** deforested area:
  does that solve the problem?
- And why blaming agriculture only? What about timber? Infrastructure? Governmental policies?

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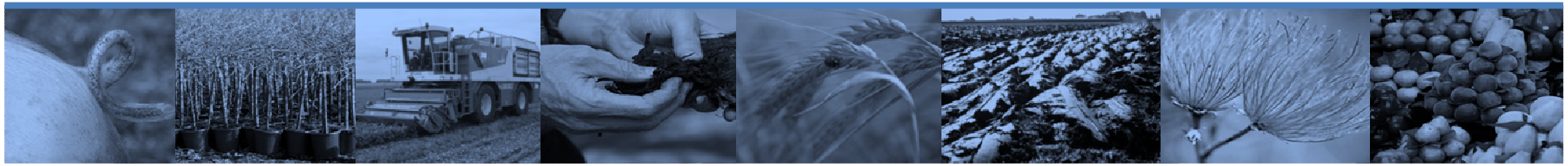
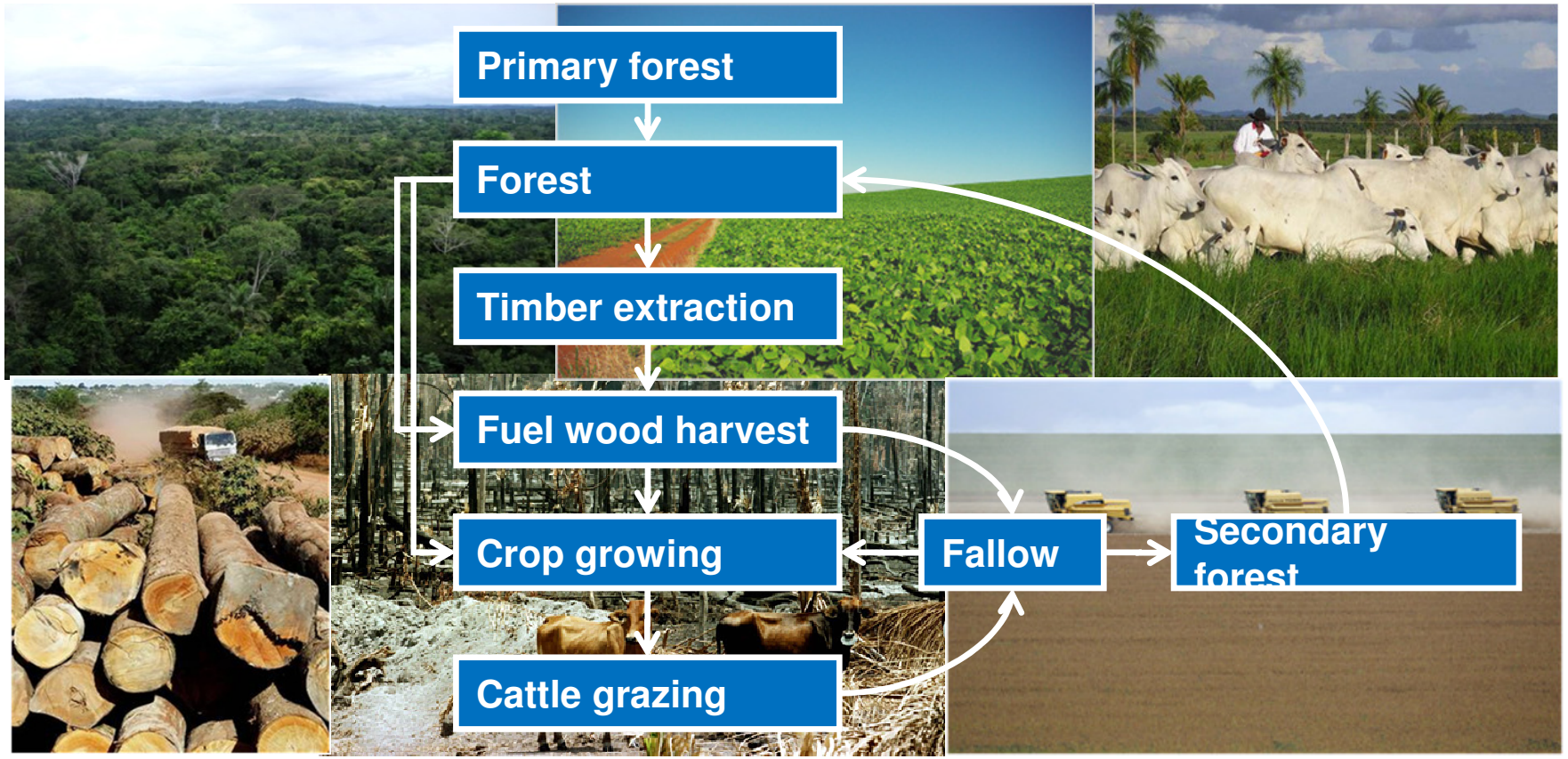


Activities related to land conversion



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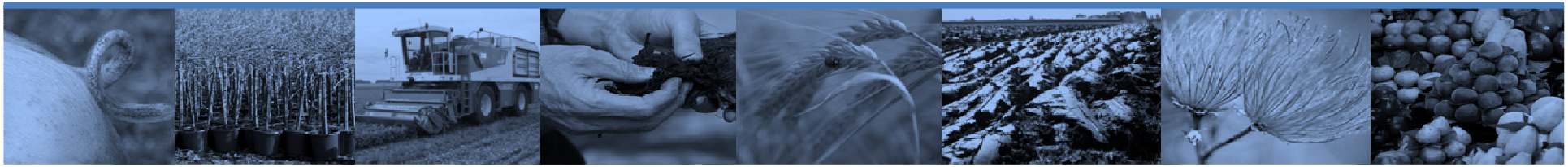

Methods

- Indirect land use change methods focus on scenarios using assumptions on market effects
  - Good for policy choices, but not for carbon footprints
- We suggest the following method:
  - Allocate between timber extraction and agricultural land use activities based on revenue
  - Allocate between expanding agricultural land use in a country (Brazil: soybean, sugarcane, pastures, etc.)

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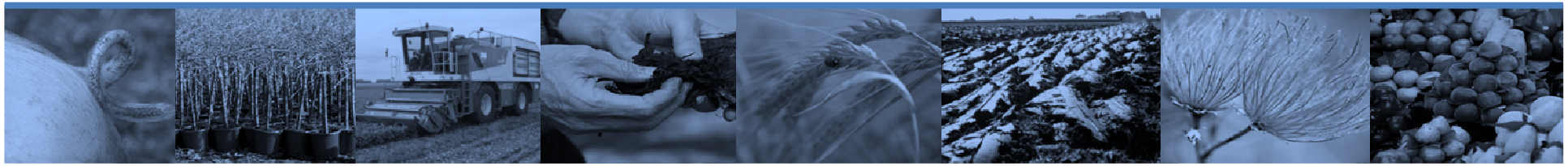

Allocation between timber & agriculture

- Timber harvest in Brazil:
  - 20 m^3 per hectare
  - stumpage value US$13 per m^3
  - US$250 per hectare
- The returns of a hectare of deforested land is about US$460
  (based on Grieg-Gran. 2008. The cost of avoiding deforestation. iied.)
- **So:**
  - **35% of emissions to timber and**
  - **65% to agricultural expansion**
  - (In Indonesia and Malaysia 55% goes to timber!)

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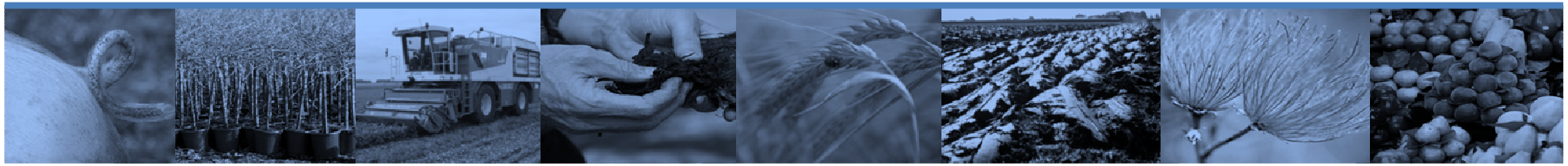
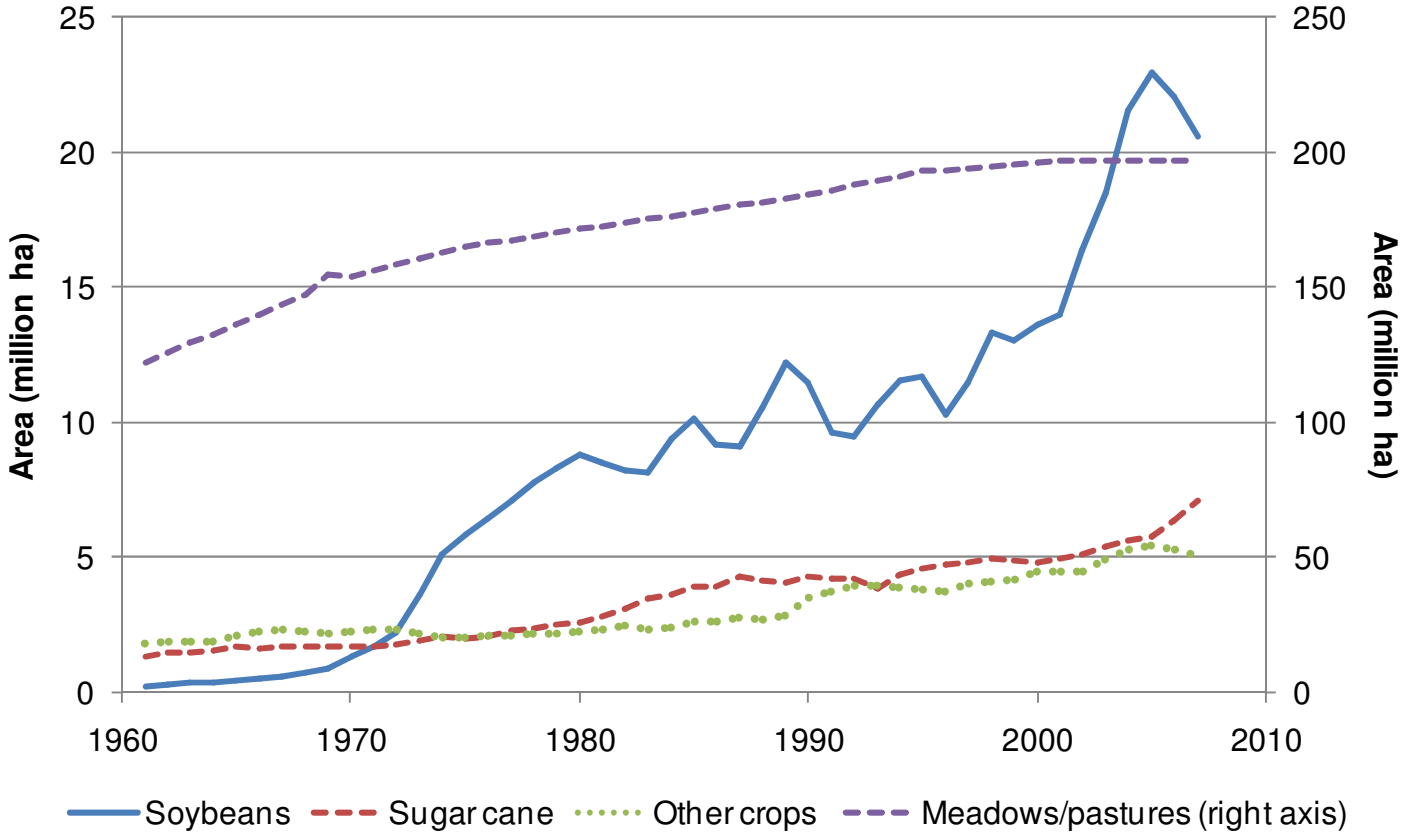


Agricultural expansion (FAO stats)



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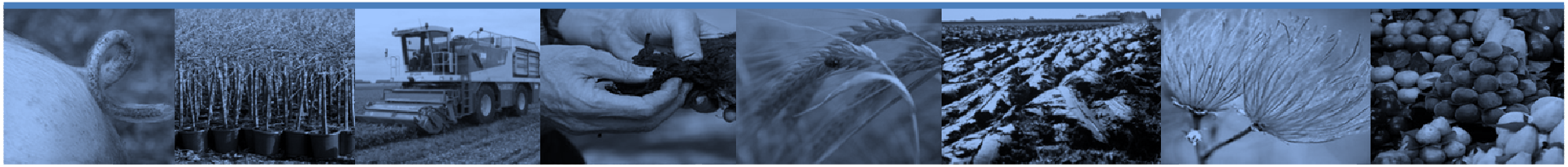
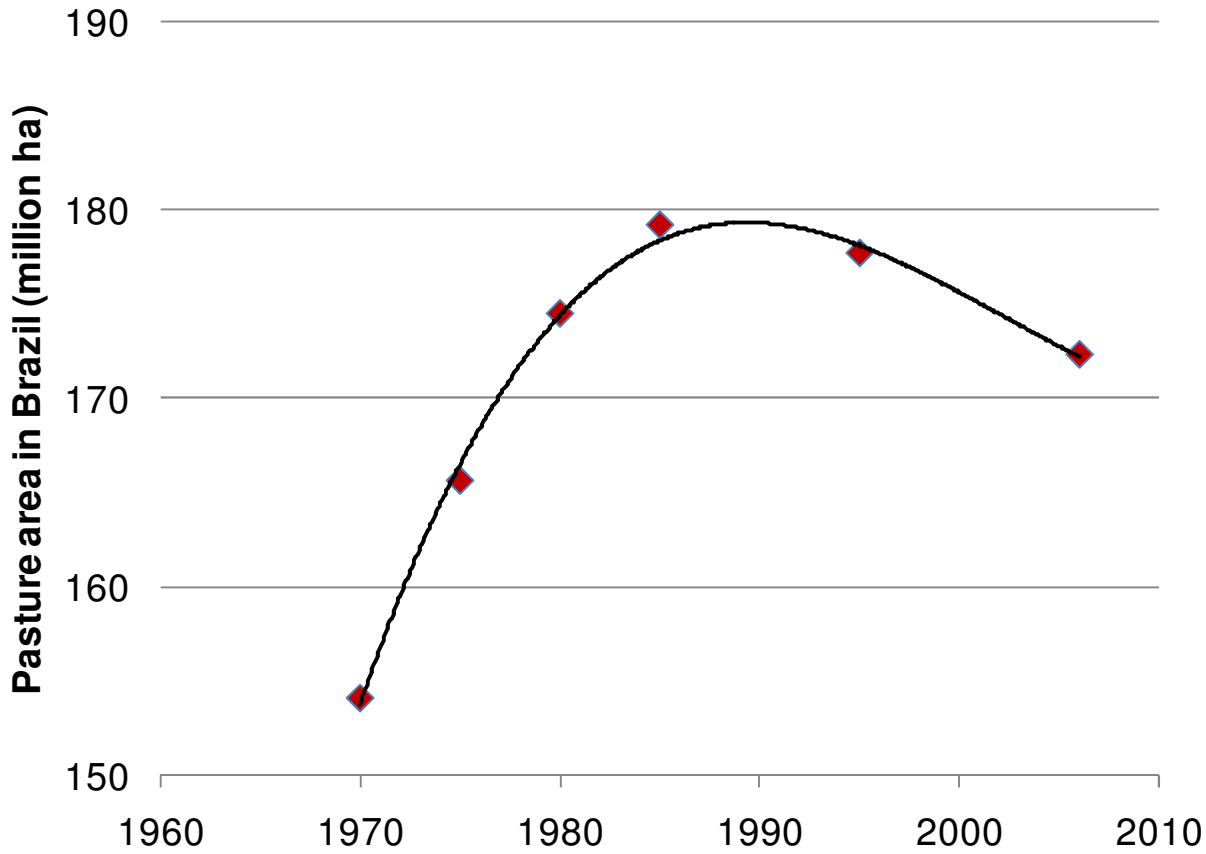


Pasture area (Brazilian census: IBGE)



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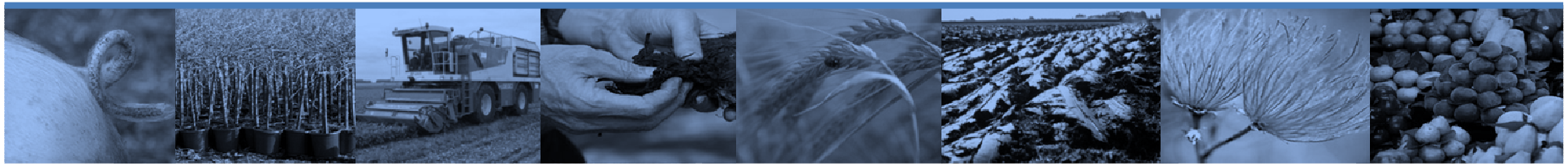

Trends between 1989 and 2008

- Soybean: 0.64 million ha per year
- Sugar cane: 0.14
- Other crops (+): 0.12 (expanding)
- *Total expanding:* *0.90*
- Other crops (-): -0.36 (contracting)
- **So, 60% of the area for expanding activities comes from land conversion (1 - 0.36/0.90)**

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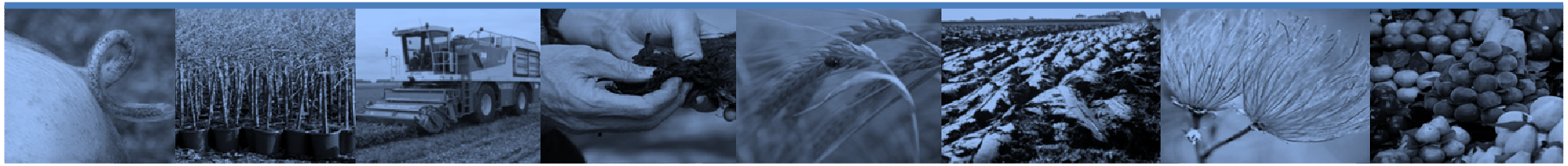
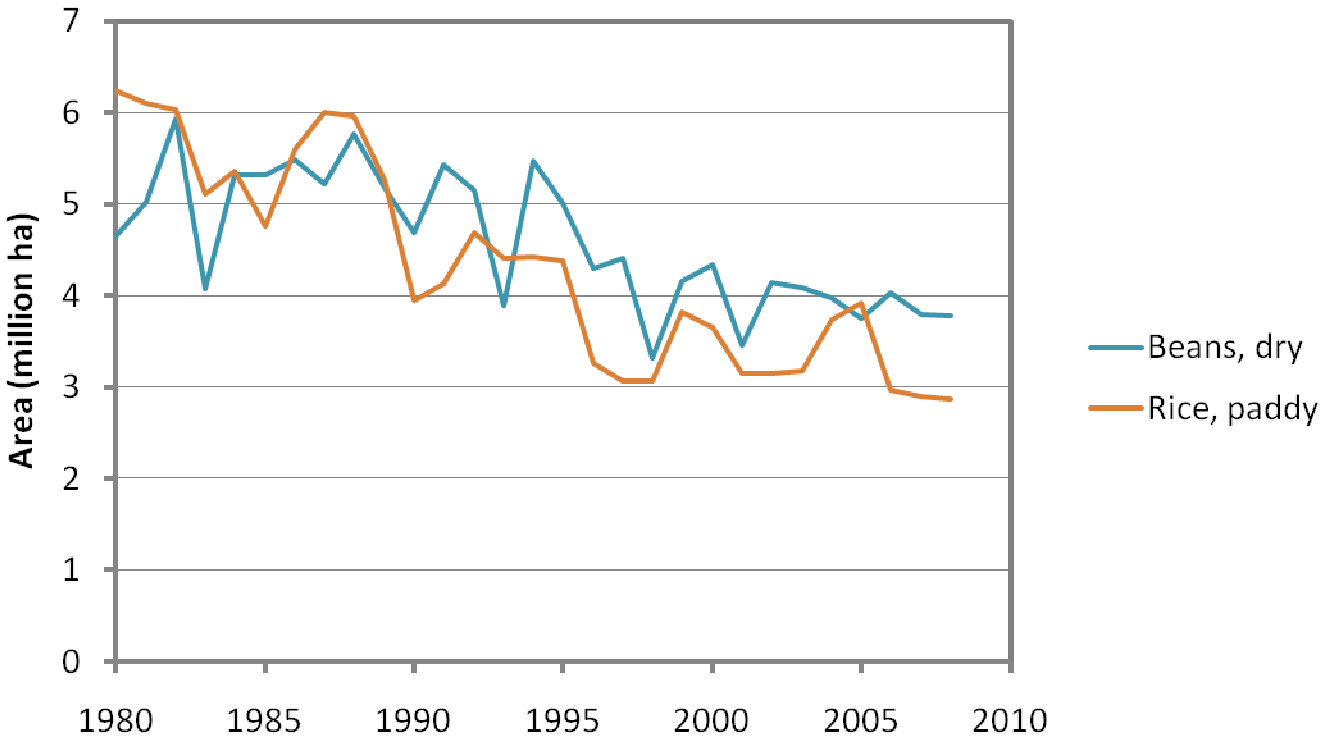


Especially beans and rice



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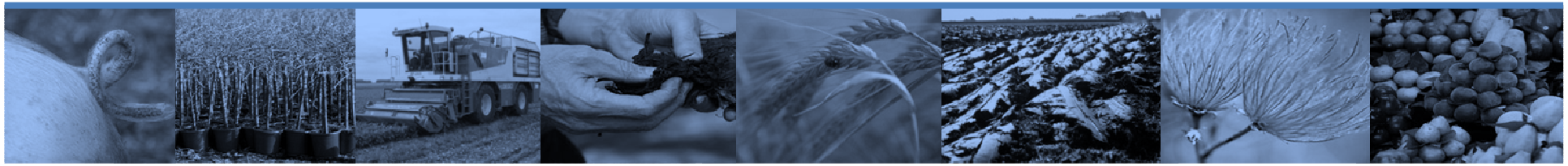

Results: carbon footprint

Parameter	Value	Units
Emissions from deforestation (a)	500	kg CO_2eq/ha/year
Allocation fraction to agriculture (b)	0.65	-
Fraction expansion from forest (c)	0.60	-
Expected soybean expansion (d)	0.64	10^6 ha/year
Soybean area in 2010 (e)	22	10^6 ha
Land conversion carbon footprint (a x b x c x d/e)	**5.7**	**kg CO_2eq/ha**
Carbon footprint (without land conversion)	*1.4*	*kg CO_2eq/ha*

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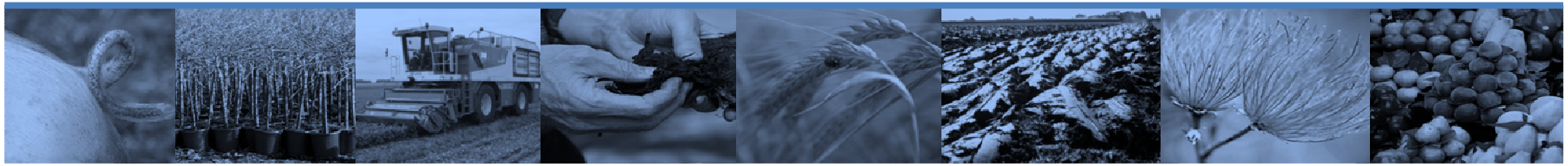
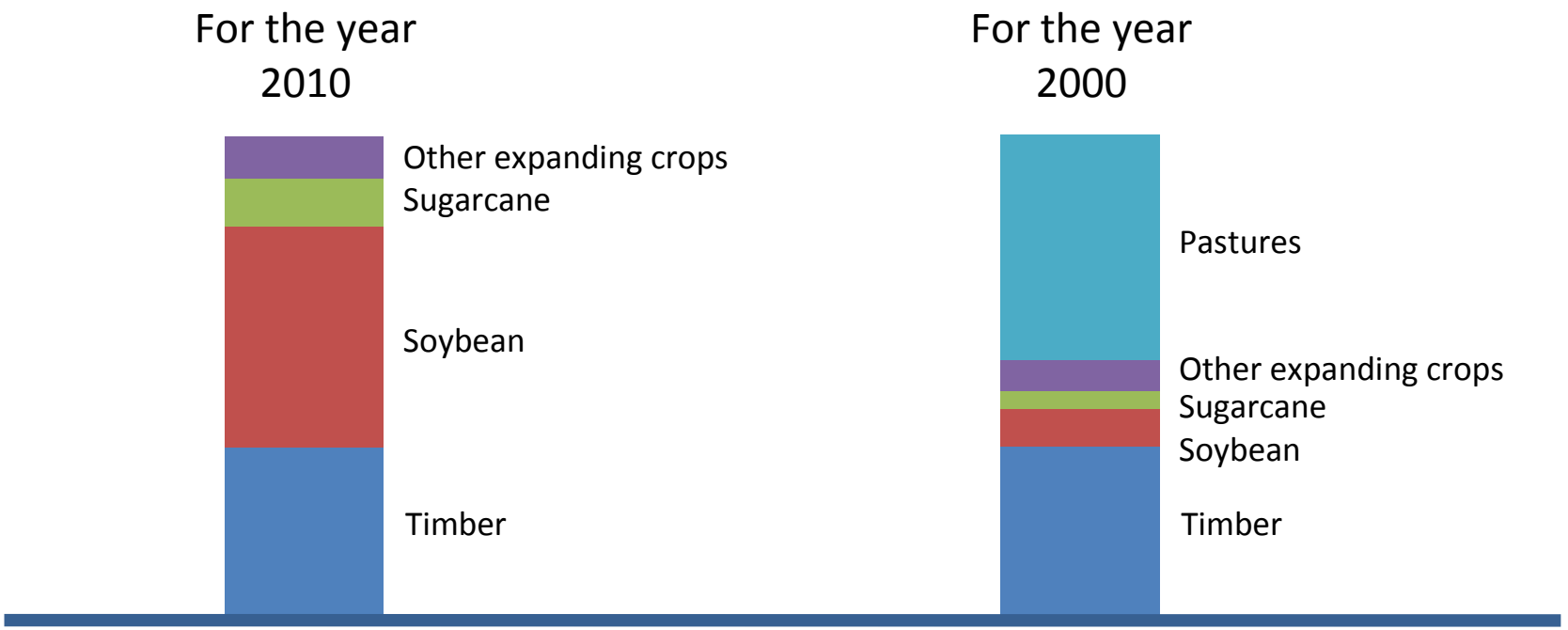


Comparing allocation in 2010 & 2000



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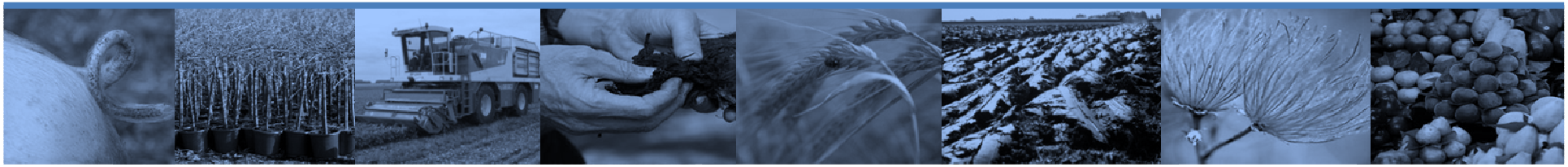

Second order effect

- We recommend that emissions from land conversion are reported separately from the carbon footprint
  - 1st because of the indirect relation between land use and land conversion (other sources are directly related)
  - 2nd because of methodological and data uncertainty
- Carbon footprints are for gaining insight, consequences of decisions should be evaluated using consequential LCAs (or other tools)

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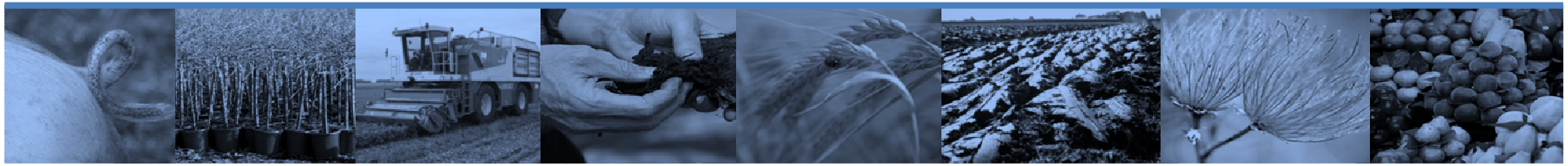
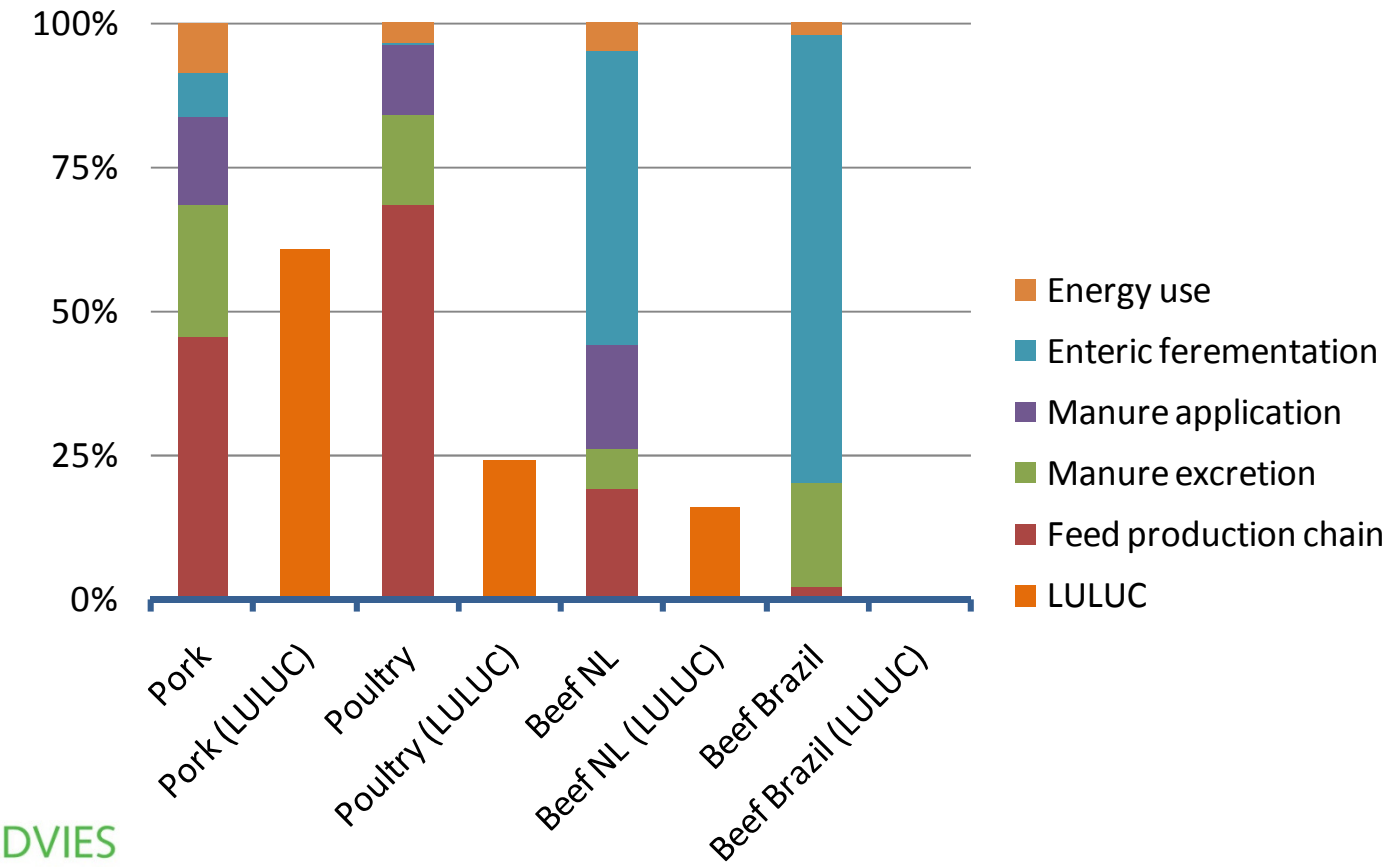


Carbon footprints of meat



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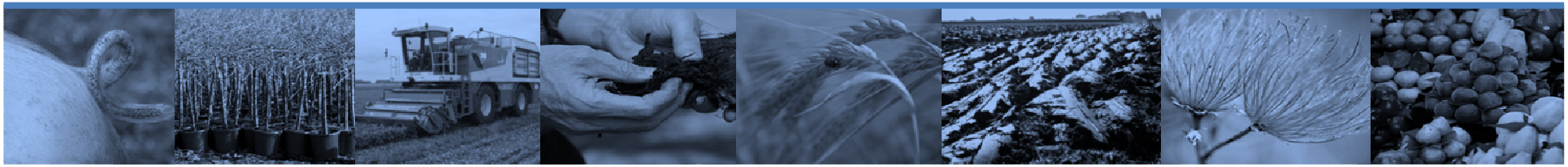
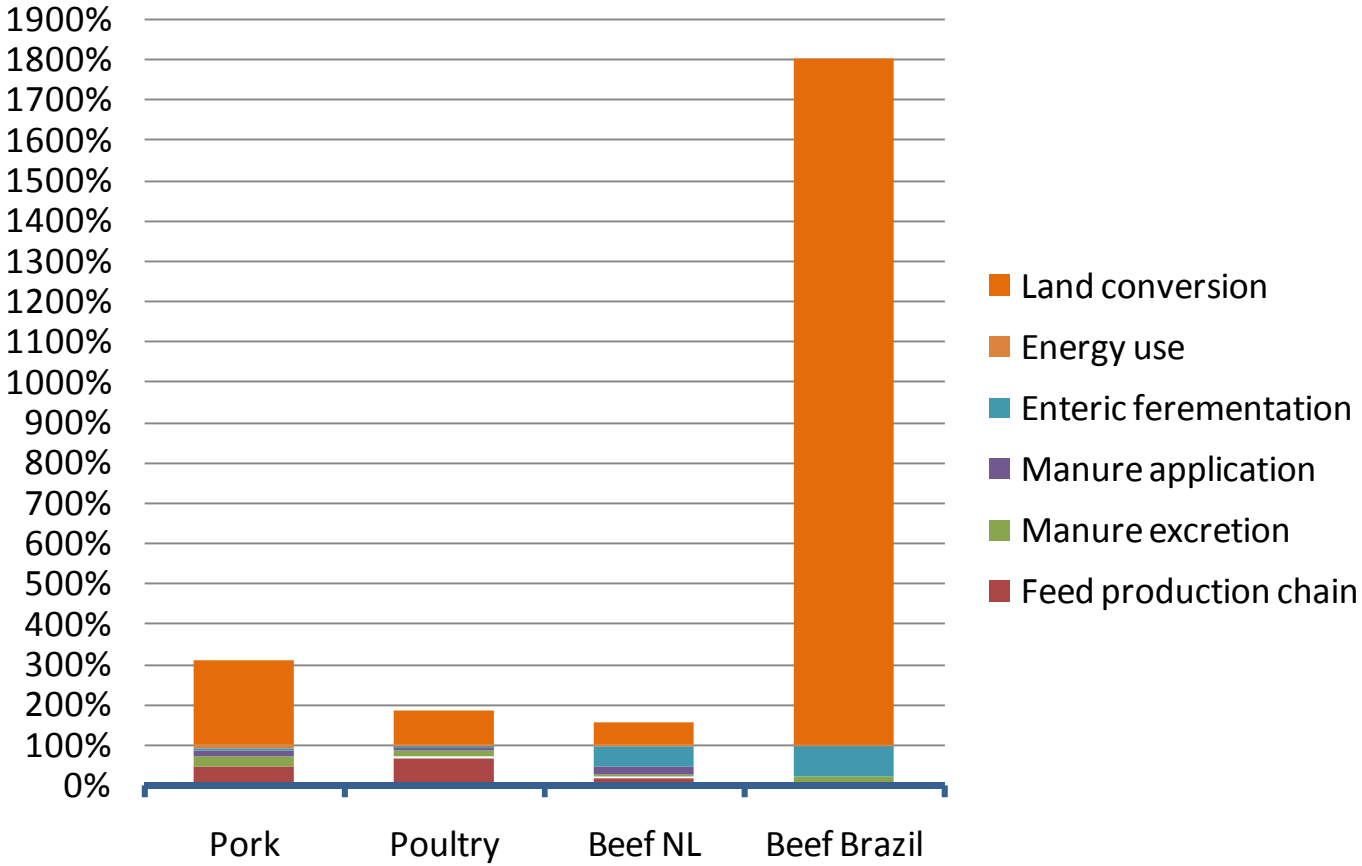


Carbon footprints of meat (PAS2050)



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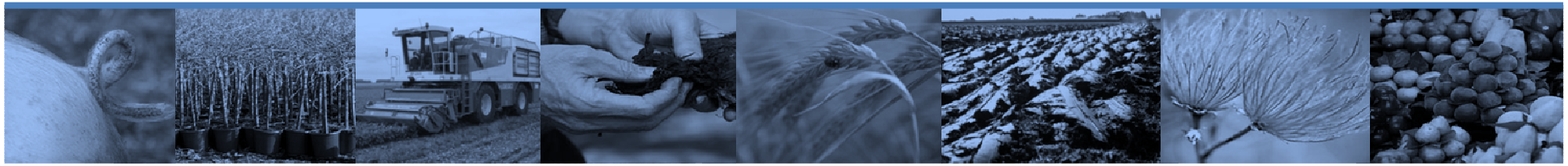

Conclusions

- The proposed method works with available data
- Simple approach makes it transparent
- Publishing annual updates of crop-country specific emission factors could motivate producers and policy makers to reduce pressure on land (more sustainable use of existing land)

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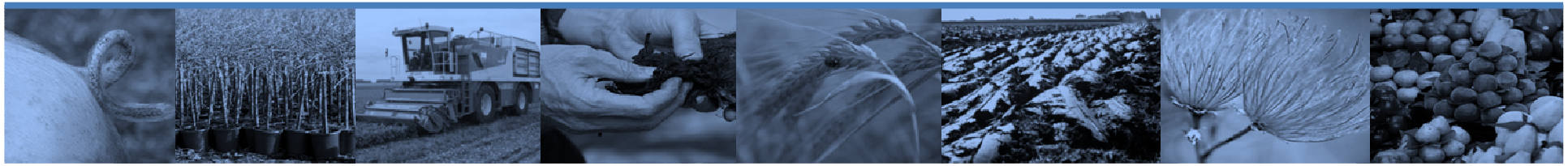

Thank you!

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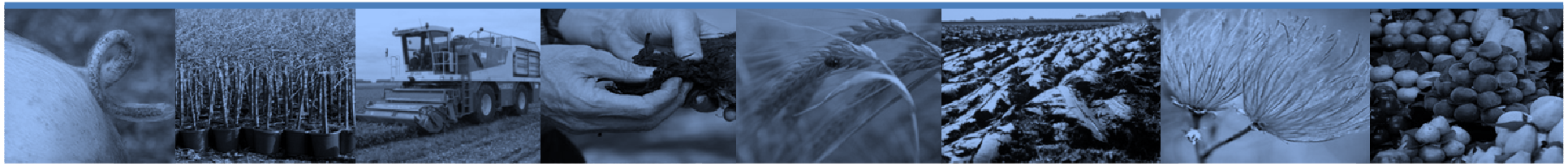
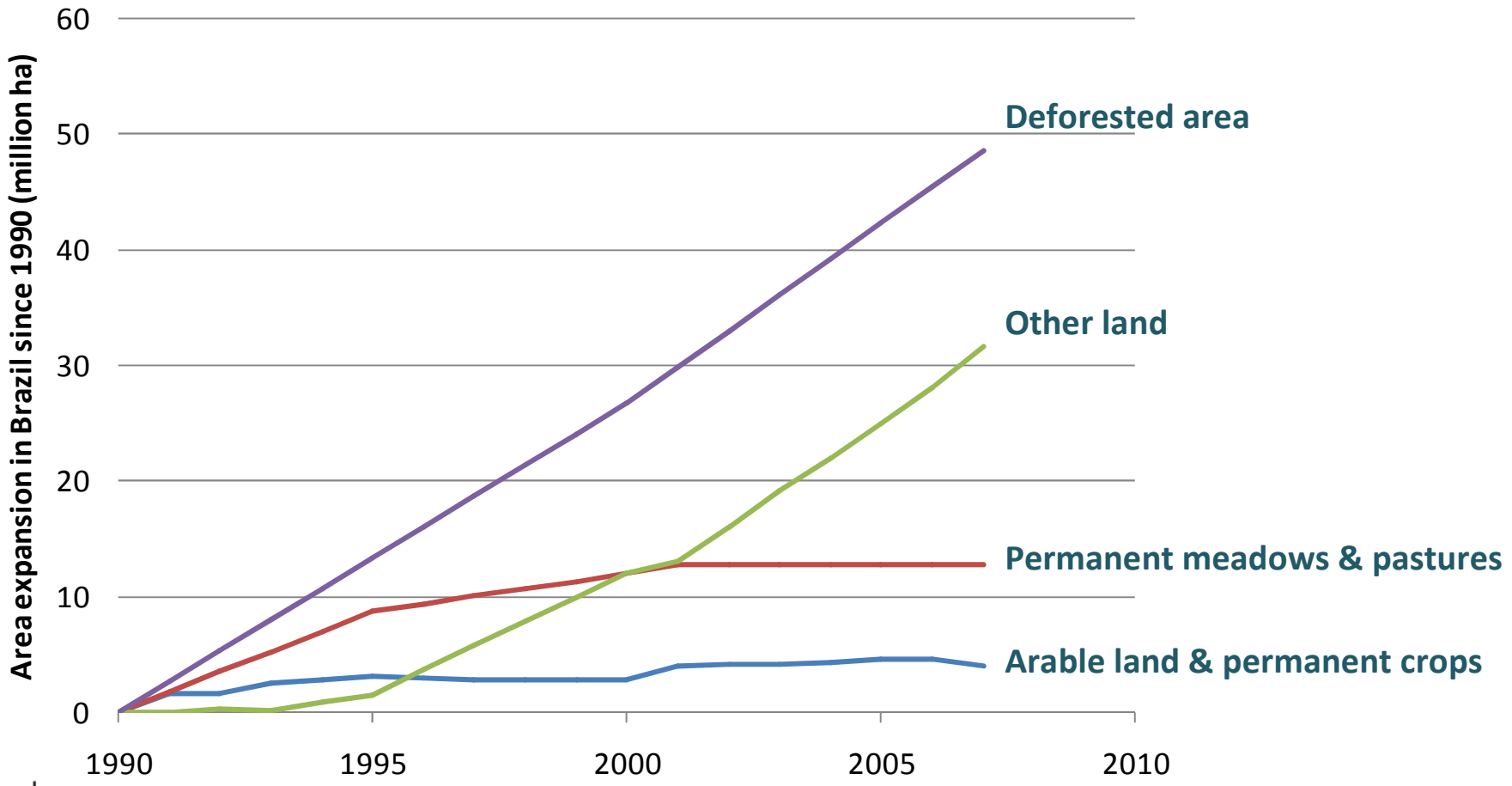


Other land?



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