

At what scale should livestock-forest systems be considered?

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Introduction

- Beef production is a major source of greenhouse gas emissions (GHGE) and impacts can be offset by afforestation
- In terms of greenhouse gas emission, the integration of livestock and trees can be considered at a range of scales.
- This poster considers the production of beef and wood at a global scale, using a case study of Brazil and the UK.

Concept

Comparative advantage:
"Two countries which have different relative costs of production will both gain from trade if each country specializes on producing the goods with lower relative costs of production".
David Ricardo

Assumptions

- Beef produced in the UK typically results in a third lower GHGE per tonne of beef that that from Brazil (Webb et al. 2013)
- Planted forests in Brazil yield 2.3-3.6 times more per hectare than in the UK

Hypothesis

Using the "environmental" comparative advantage of each country, increasing beef production in the UK while supporting afforestation practices in Brazil may be the most effective way to achieve a net or even negative international greenhouse gas balance.

Methodology

- The GHGE of beef and wood production in Brazil and the UK was determined by Life Cycle Assessment (LCA) (Sanchez Martinez 2011).
- Focused was on global warming potential over 100 years (GWP_{100}) per tonne of wood or beef, assuming both consumed in the UK
- Representative forest systems described for Brazil and UK over 60 years from a literature review

Results

Wood: the GHGE per tonne of pallet production in Brazil was greater than for the UK (Figure 1). But, greater wood production per area means that net emissions per hectare are lower (Fig. 2).

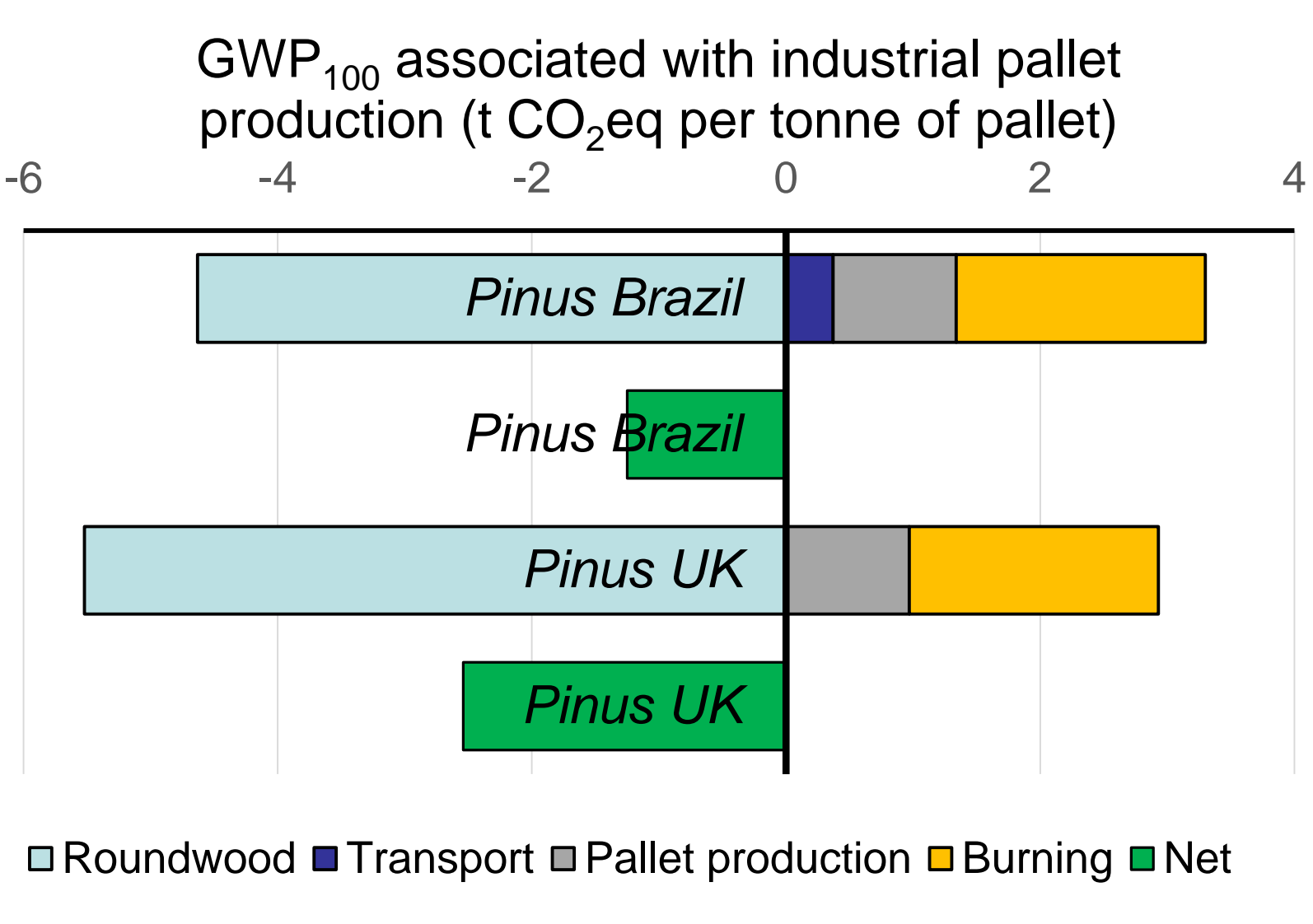


Figure 1 Global warming potential (GWP_{100}) of pallets made from pine (which are burnt) delivered to the UK from either UK or Brazil

Beef: the planting of 1 ha of pine in the UK, used for pallets, could offset the GHGE of 2.8 t of beef carcass from Brazil or 4.2 t of beef from the UK. Planting 1 ha of pine in Brazil could offset 5.0 t of beef from Brazil or 7.5 t from the UK (Table 1).

Table 1. Weight of beef of which emissions could be offset by planting 1 ha pine forest to produce wooden pallets

	Pinus Brazil	Pinus UK
Beef Brazil (t carcass)	5.0	2.8
Beef UK (t carcass)	7.5	4.2
Pallets (t)	130	36

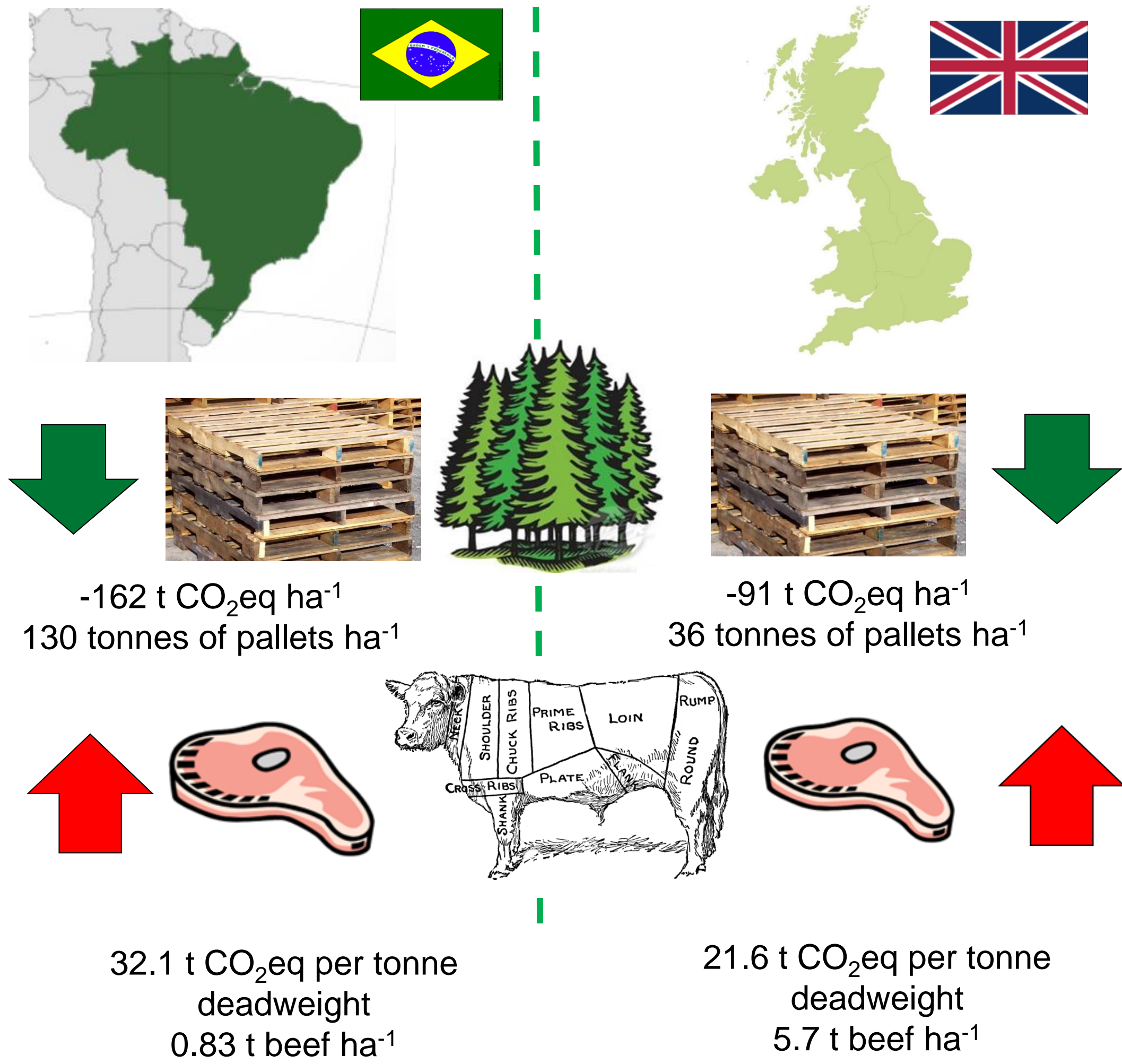


Figure 2. Beef and wooden pallet production per hectare in the UK and Brazil over 60 years. Products delivered to the UK

Conclusions

From a global perspective to reduce GHG emissions, offsetting beef production in the UK with wood production in Brazil is an environmentally beneficial livestock-forest system. The study does not cover social, economic, or other environmental effects.

References
Webb, J., Williams, A.G., Hope, E., Evans, D. and Moorhouse, E. (2013) Do foods imported into the UK have a greater environmental impact than the same foods produced within the UK? International Journal of Life Cycle Assessment, 18 (7), 1325-1343.
Sanchez Martinez, P.J. (2011). International Approaches to Climate Change Mitigation: using the "Environmental" Advantage to reduce Beef Production GHG Emissions. MSc thesis. Cranfield University, UK. We acknowledge help from Sandra Santos and Edilson de Oliveira of Embrapa in providing data from Brazil.