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Reassessing the role of cattle and pasture in Brazil’s deforestation: a response to “Fire, deforestation, and livestock: When the smoke clears”

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ABSTRACT

Silva et al. (Land Use Policy, 21 July 2020) offer an assessment of the links between deforestation, livestock production and exports in Brazil. Their analysis, based on relative changes in beef production and pasture area across the whole of Brazil, showed an “apparent decoupling of the link between beef production and deforestation in Brazil”. In reanalysing these links, we find that Silva et al. underestimate the strong, positive and significant associations between Brazilian livestock production and deforestation. Moreover, despite focusing the title, abstract and the beginning of their manuscript on the Amazon, their analyses are conducted at the national level, and fail to recognize marked differences in the development trajectories of Brazilian biomes, and that most of the recent pasture expansion in Brazil has replaced Amazonian forests. To progress any debate and aid decisionmaking regarding land-use changes in the Amazon, a region often in the spotlight and subjected to many debates that lack evidence, scientists must be open and scrupulous with their data sources and analyses.

In exploring links between livestock production and pasture area in Brazil between 1985 and 2018, Silva et al. (2021) suggest a decoupled relationship between deforestation and land used for beef production. Silva et al. alleged that narratives surrounding Amazonian fires in 2019 were strongly based on political and emotional beliefs yet their analysis do not explore the links between deforestation and wildfires. Moreover, by conducting their analysis at the national rather than regional scales, the authors obscure clear evidence showing that the expansion of Brazilian cattle production has come at the expense of Amazonian forests. Here, we show that their conclusions are erroneous both at national and, especially, at the biome scales.

First, Silva et al. claim that “sustainable intensification of predominant livestock pastures may be acting as a significant buffer between meat demand and livestock production and consequent land use change and deforestation”.

Using alternative datasets, we show that livestock intensification (i.e. increased cattle herd size; Fig. 1A) in Brazil over that past 35 years did not prevent pasture expansion in the Amazon biome (Fig. 1B). Our analysis also shows that livestock intensification outside the Amazon has brought around relative modest changes in stocking densities between 1985 and 2019 (from 1.09 to 1.28 cattle heads per hectare), and that stocking densities in the Amazon are already very close to those levels (1.2 in 2019; Fig. 1C). Contrary to Silva et al., our analysis therefore suggest that intensification has played a relatively small role in buffering the impact of livestock demand, and has not prevented pasture expansion in the Amazon. This is particularly worrying for a country like Brazil, which is both home to Earth’s largest remaining tropical rainforest and a global leader in beef production and exportation (FAOSTAT, 2020) and deforestation (Turubanova et al., 2018).
Brazilian Amazon
Other biomes

From 1985–2019, the total pasture area in the Brazilian Amazon biome rose from 16.4–52.7 million hectares (MapBiomas, 2020), a 221 % increase in the land area converted to pasture. Importantly, these figures do not account for the rise in deforestation rates that occurred in 2020, when the Brazilian Amazon lost over 1.1 million hectares of forests (TerraBrasilis and INPE, 2020) – the highest annual loss since 2008. Although most of the Brazilian agricultural production is legally deforestation-free, at least 17 % of beef and 20 % of soy exports to the European Union have been associated with illegal deforestation in the Amazon and Cerrado biomes (Rajão et al., 2020).

Third, according to Silva et al., “linking ruminant production and consumption to land clearance, greenhouse gas emissions (GHGs) and biodiversity loss is a plausible sell for international campaigners and global media eager for a simple narrative on culpability”. Yet, these links are demonstrated by the data (e.g. Green et al., 2019) and not narratives, as lagged prices of soy and beef commodities explained over 75 % of the total variation in forest loss rates between 1995 and 2007 (Arima et al., 2014). Not unexpectedly, deforestation in the Brazilian Amazon is concentrated inside the soy and pasture belt on the south-eastern edge, the so-called ‘Arc of Deforestation’ (Vieira et al., 2008). Also, decades of research shows that as tropical forest loss and degradation increases so do (i) biodiversity losses (Barlow et al., 2016); and (ii) greenhouse-gas emissions (Pearson et al., 2017), given that trees cleared and burned to make way for pastures release back to the atmosphere the carbon they naturally capture whilst growing (Soares-Filho et al., 2006). Finally, the FAO – the same data source Silva et al. used for some of their analyses – has reported that ruminant production through enteric fermentation is responsible for around 65 % of the global greenhouse-gas emissions from the entire livestock sector and 14.5 % of all human-induced emissions (Gerber et al., 2013). Not surprisingly, the total CO2 emissions of Brazilian agriculture were highly correlated not only with pasture area but also with beef production and exports (Figure S1; both Pearson’s $r ≥ 0.85$). Although more research is needed, these findings call attention to the fact that intensification of livestock production may continue to generate negative environmental externalities such as increased greenhouse gas emissions (Balmford et al., 2018).

The recent surge in deforestation in the Amazon finally extinguished any hope that Brazil would meet its targets of reducing deforestation rates in the biome by 80 % of the 1996–2005 historic rates by 2020 (Government of Brazil, 2008). If agricultural expansion continues, we may lose more than 40 % of the entire Amazon by 2050 (Soares-Filho et al., 2006), pushing the entire ecosystem closer to a dangerous tipping point (Nobre et al., 2016). Despite the recent reductions in funding for environmental management, the suspension of the Amazon fund and reassignment of environmental agency duties (Pelicce & Castello, 2021), we are still hopeful that Brazil can rediscover its environmental leadership (Ferreira et al., 2014). However, we will need coordinated efforts between public policies (e.g. Hansen et al., 2020), investors (Nazaren and Laurance, 2020) and supply-chain initiatives aiming to reduce deforestation (Lambin et al., 2018). The zero-deforestation
agreements that major soybean and beef traders signed in 2006 and 2009, respectively, provide examples of how this could work (Gibbs et al., 2016, 2015). Their effectiveness, however, depends on strengthening the integration between agrarian and environmental legislation (Carvalho et al., 2019), law enforcement (Arima et al., 2014) and increasing the supply chain transparency and traceability (Gardner et al., 2019; Garrett et al., 2019). Finally, dismissing important environmental concerns as a “simple narrative on culpability” is counterproductive and will detract from the benefits that can emerge when science is used to inform agricultural development and biodiversity conservation (Ciência e Sociedade, 2020).

Author contributions statement
FMF designed the study. FMF analysed the data with input from RS, JB and LPM. All authors contributed to the manuscript writing and approved the final publication.

Code availability
For the codes is available from the corresponding author upon request.

Data availability
Datasets and data sources are provided in the supplementary material.

Declaration of Competing Interest
The authors report no declarations of interest.

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References

Appendix A. Supplementary data
Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.landusepol.2020.105195.

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