

Carbon tradeoff: Which is better for the environment — grain-fed or pasture-raised beef?

Beef production accounts for the largest share of global livestock greenhouse gas emissions and is an important target for climate mitigation efforts. Most life-cycle assessments comparing the carbon footprint of beef production systems have been limited to production emissions. None also consider potential carbon sequestration due to grazing and alternate uses of land used for production. We assess the carbon footprint of 100 beef production systems in 16 countries, including production emissions, soil carbon sequestration from grazing, and carbon opportunity cost—the potential carbon sequestration that could occur on land if it were not used for production. We conduct a pairwise comparison of pasture-finished operations in which cattle almost exclusively consume grasses and forage, and grain-finished operations in which cattle are first grazed and then fed a grain-based diet.

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We find that pasture-finished operations have 20% higher production emissions and 42% higher carbon footprint than grain-finished systems. We also find that more land-intensive operations generally have higher carbon footprints.

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In our results, soil carbon sequestration from grazing offsets only a portion of production emissions. This finding is consistent with the conclusions of Garnett *et al.* (2017), which estimated that soil carbon sequestration from grazing can offset 20–60% of annual emissions from ruminant grazing.

[**This is an excerpt. Read the original post here**](#)