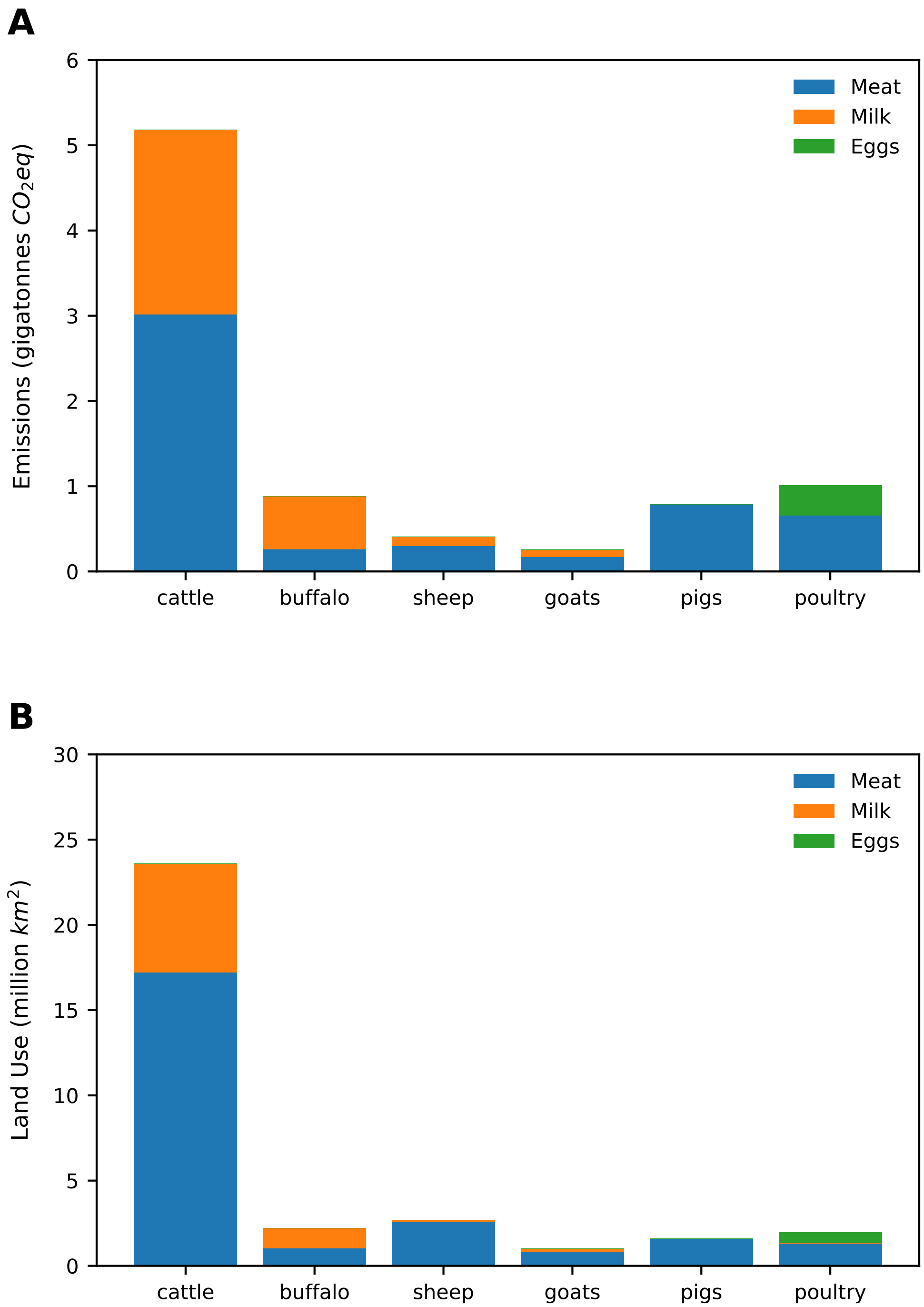


Figure 1. Global emissions and land use footprints of animal agriculture.

Total CO_2 equivalent emissions (A) assembled from species, product and country-specific production data from FAOSTAT for 2018 and species, product, region and greenhouse-gas specific emissions data from GLEAM (MacLeod et al., 2018), using CO_2 equivalents of 34 for CH_4 and 298 for N_2O. Land use (B) assembled from species, product and country-specific production data from FAOSTAT for 2018 and species and product specific land use data from (Poore and Nemecek, 2018).

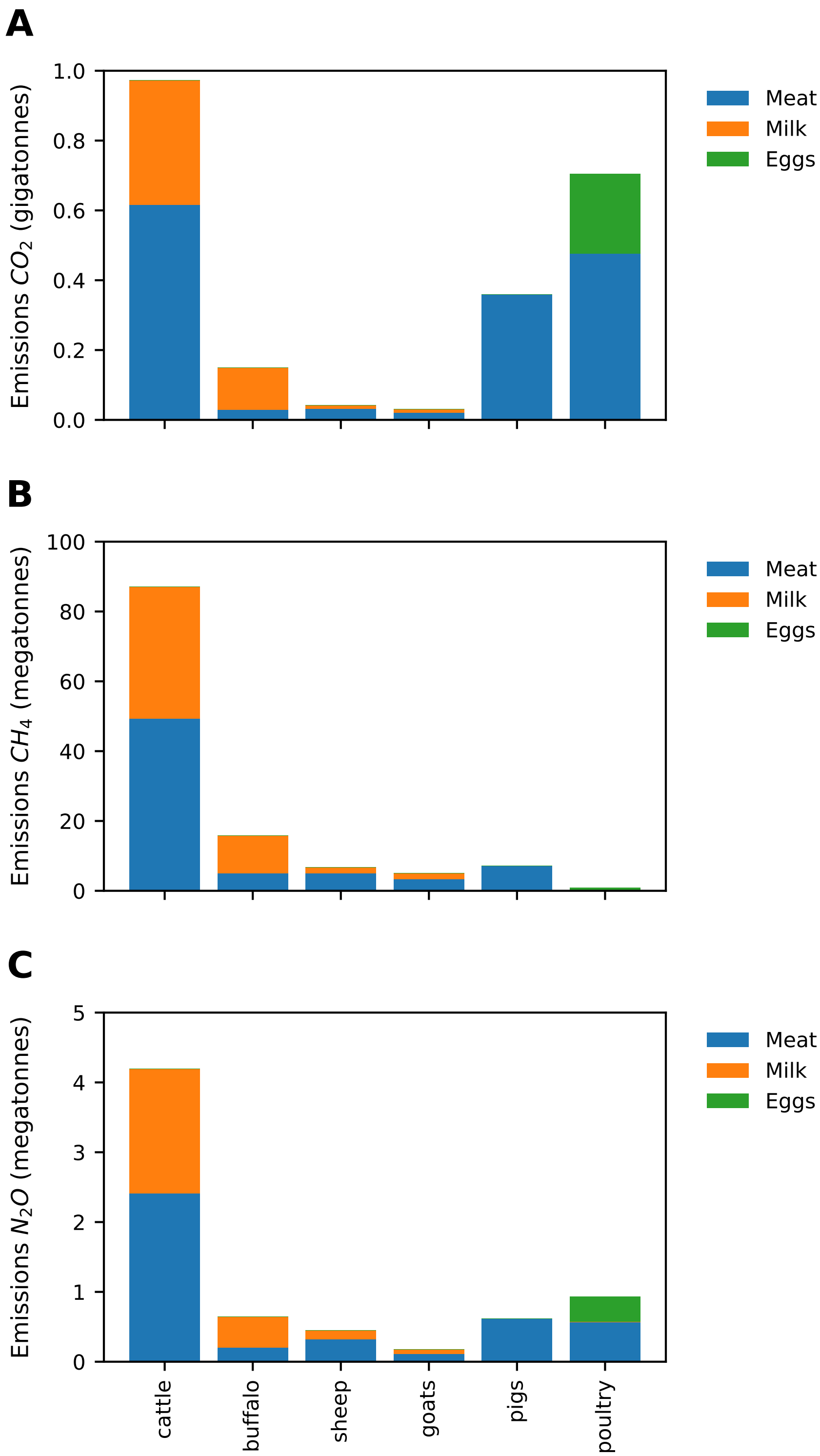


Figure 1-S1. Gas-specific emission footprints of animal agriculture.

Assembled from species, product and country-specific production data from FAOSTAT for 2018 and species, product, region and greenhouse gas-specific emissions data from GLEAM (MacLeod et al., 2018).

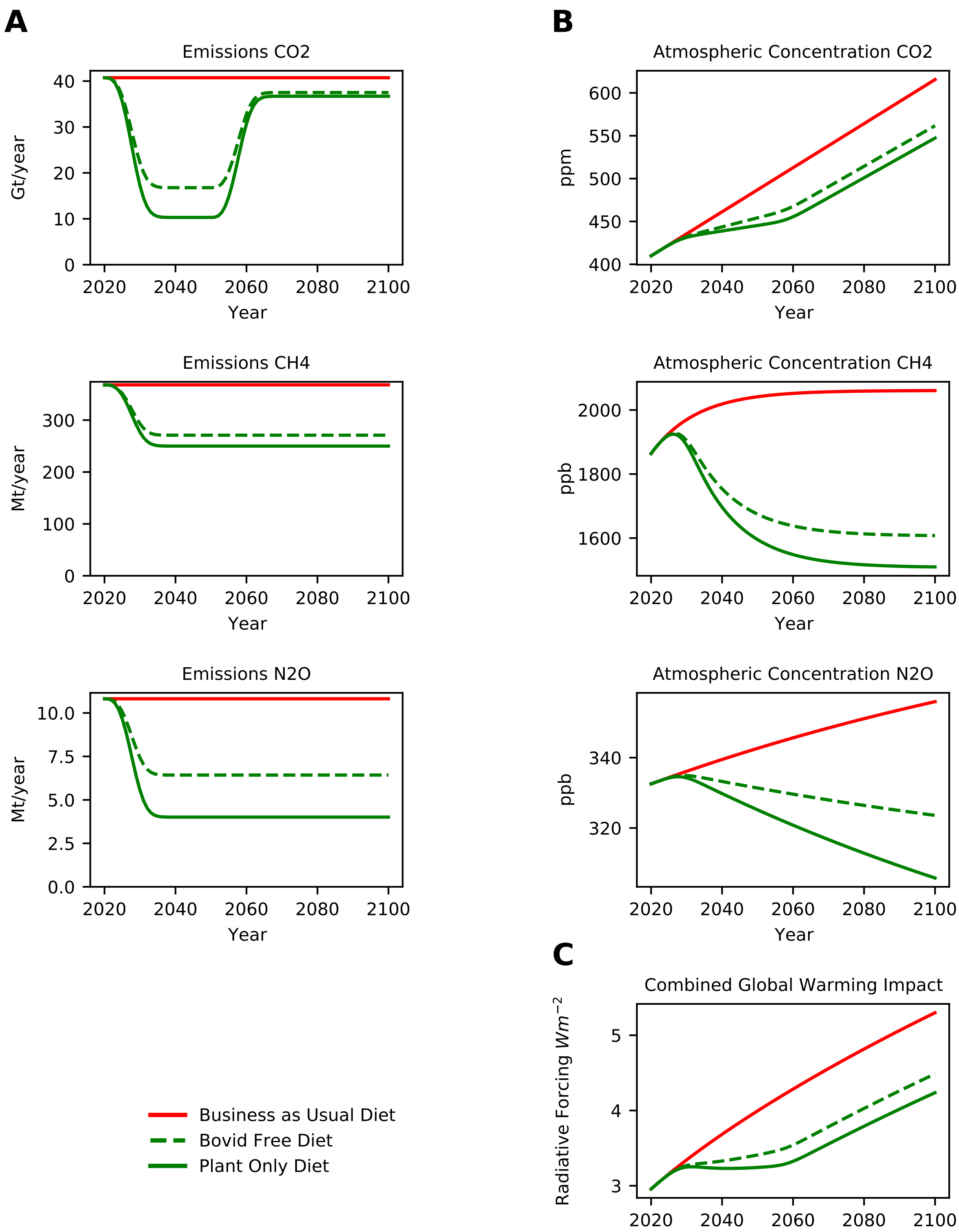


Figure 2. Impact of ending animal agriculture on atmospheric greenhouse gas levels.

(A) Projected annual emissions of CO_2, CH_4 and N_2O for Business as Usual, Plant Only and Bovid Free diets assuming 15 year transitions to new diets. (B) Projected atmospheric concentrations of CO_2, CH_4 and N_2O under each emission scenario. (C) Radiative Forcing (RF) inferred from atmospheric concentrations in (B) by formula of (Myhre et al., 1998; Ramaswamy et al., 2001) as modified in MAGICC6 (Meinshausen et al., 2011).

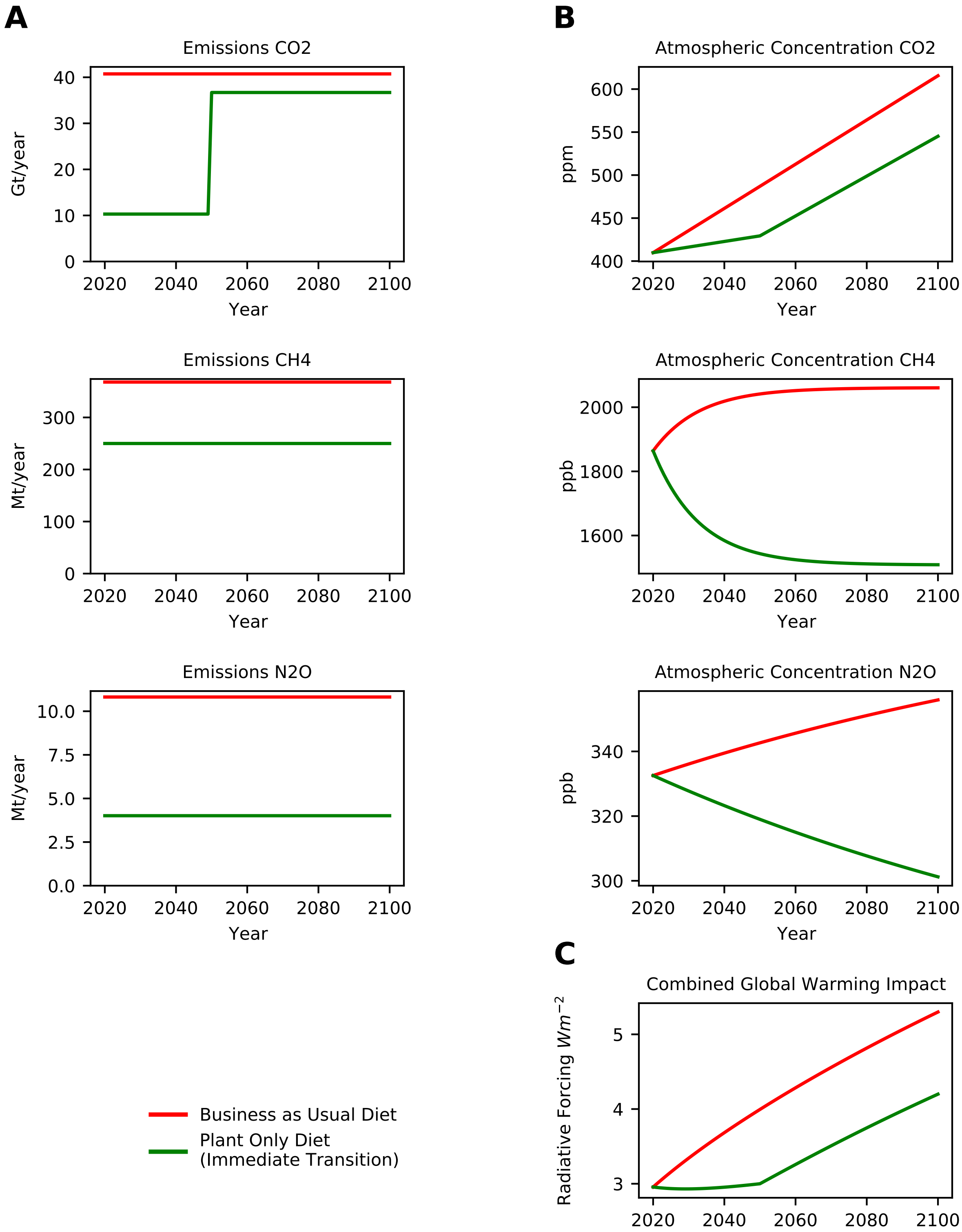


Figure 2-S1. Impact of immediate cessation of animal agriculture on GHG levels.

(A) Projected annual emissions of CO_2, CH_4 and N_2O for Business as Usual Diet and Plant Only Diet assuming an immediate dietary transition and 30 year linear carbon fixation trajectory. (B) Projected atmospheric concentrations of CO_2, CH_4 and N_2O under each emission scenario. (C) Radiative Forcing (RF) inferred from atmospheric concentrations in (B) by formula of (Myhre et al., 1998; Ramaswamy et al., 2001) as modified in MAGICC6 (Meinshausen et al., 2011).

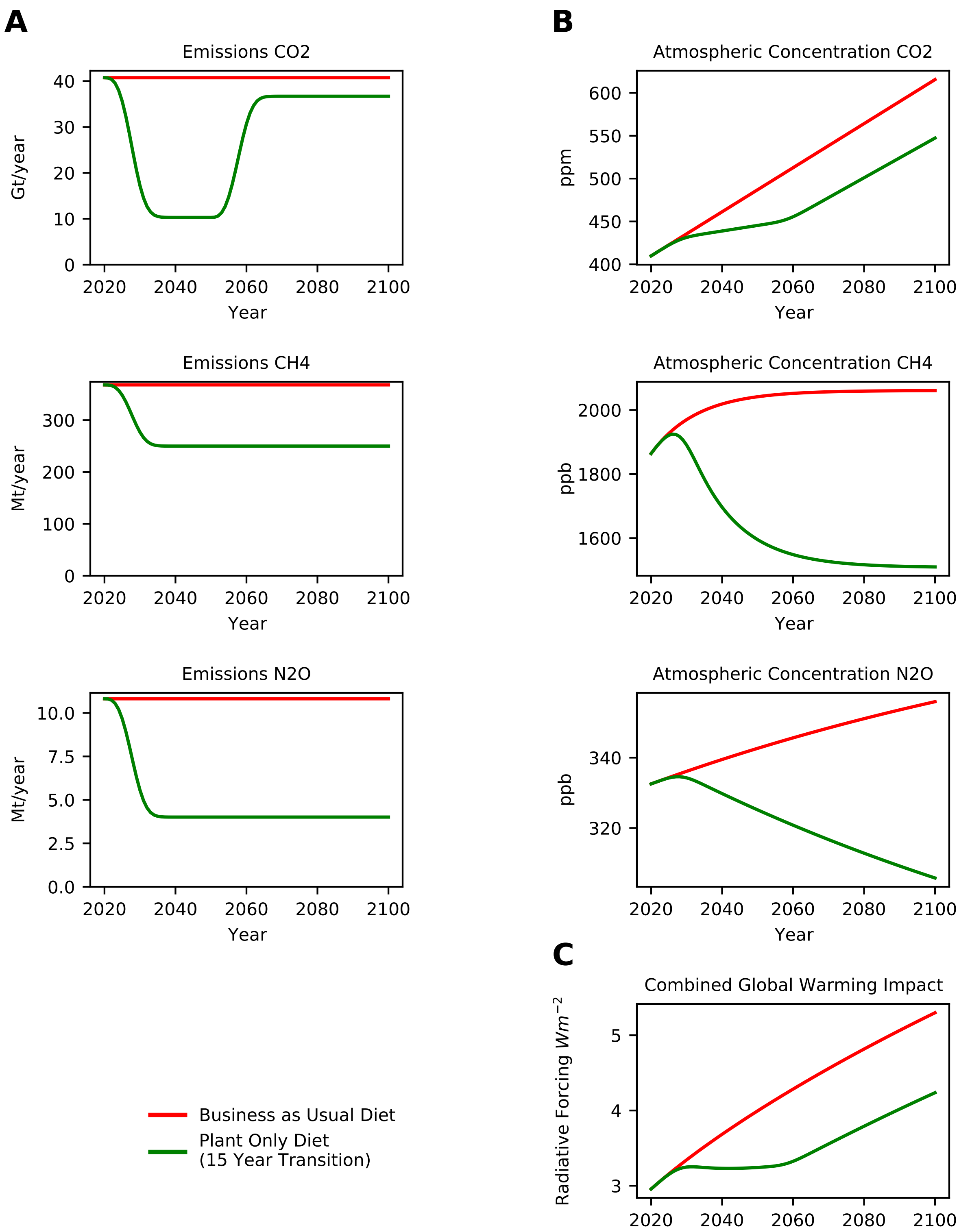


Figure 2-S2. Impact of 15 year transition to plant only diet on GHG levels.

(A) Projected annual emissions of CO_2, CH_4 and N_2O for Business as Usual Diet and Plant Only Diet assuming a 15 year transition to the new diet and 30 year linear carbon fixation trajectory on freed land. (B) Projected atmospheric concentrations of CO_2, CH_4 and N_2O under each emission scenario. (C) Radiative Forcing (RF) inferred from atmospheric concentrations in (B) by formula of (Myhre et al., 1998; Ramaswamy et al., 2001) as modified in MAGICC6 (Meinshausen et al., 2011).

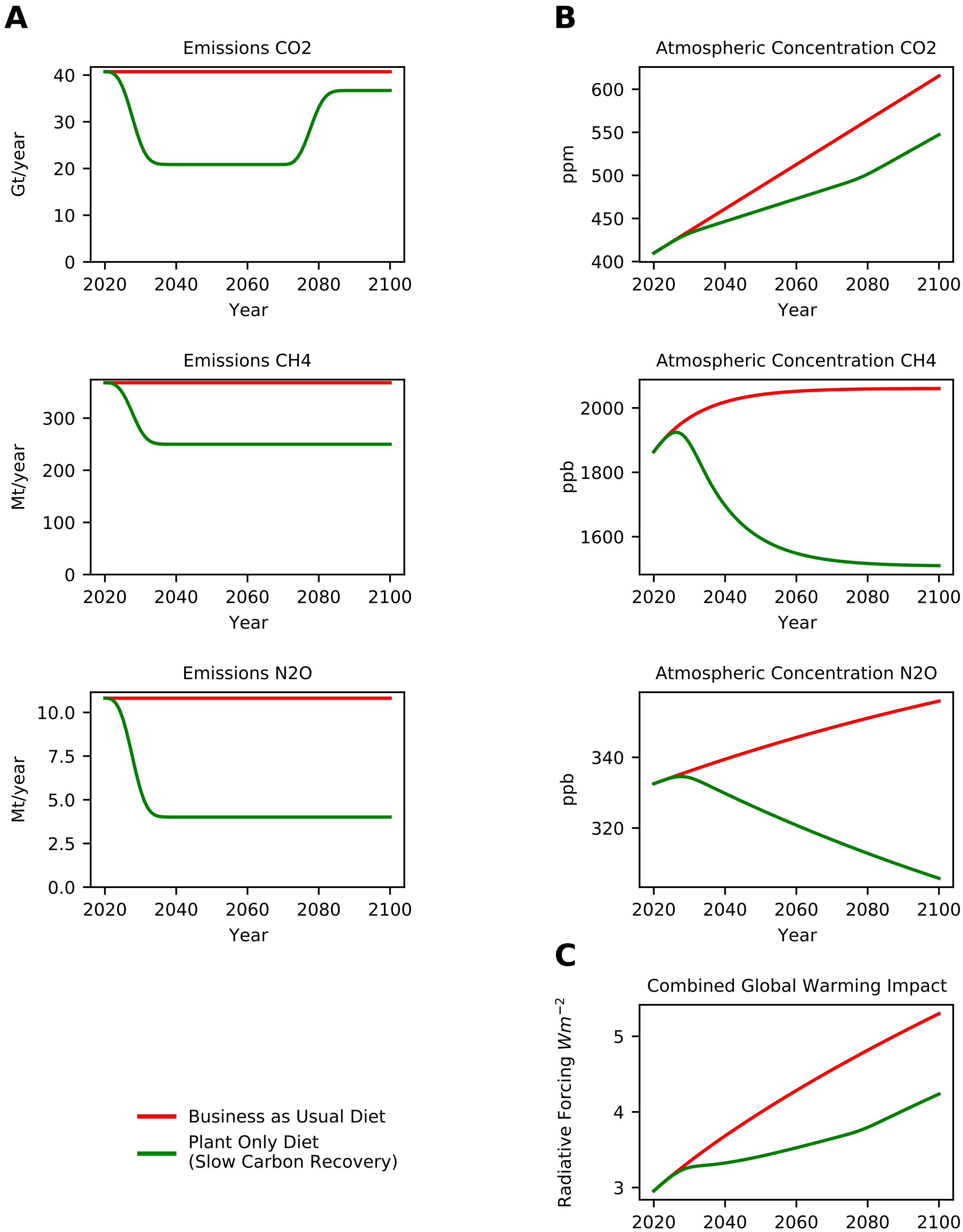


Figure 2-S3. Impact of slower carbon fixation on GHG levels.

(A) Projected annual emissions of CO_2, CH_4 and N_2O for Business as Usual Diet and Plant Only Diet assuming a 15 year transition to the new diet and 50 year linear carbon fixation trajectory on freed land. (B) Projected atmospheric concentrations of CO_2, CH_4 and N_2O under each emission scenario. (D) Radiative Forcing (RF) inferred from atmospheric concentrations in (B) by formula of (Myhre et al., 1998; Ramaswamy et al., 2001) as modified in MAGICC6 (Meinshausen et al., 2011).

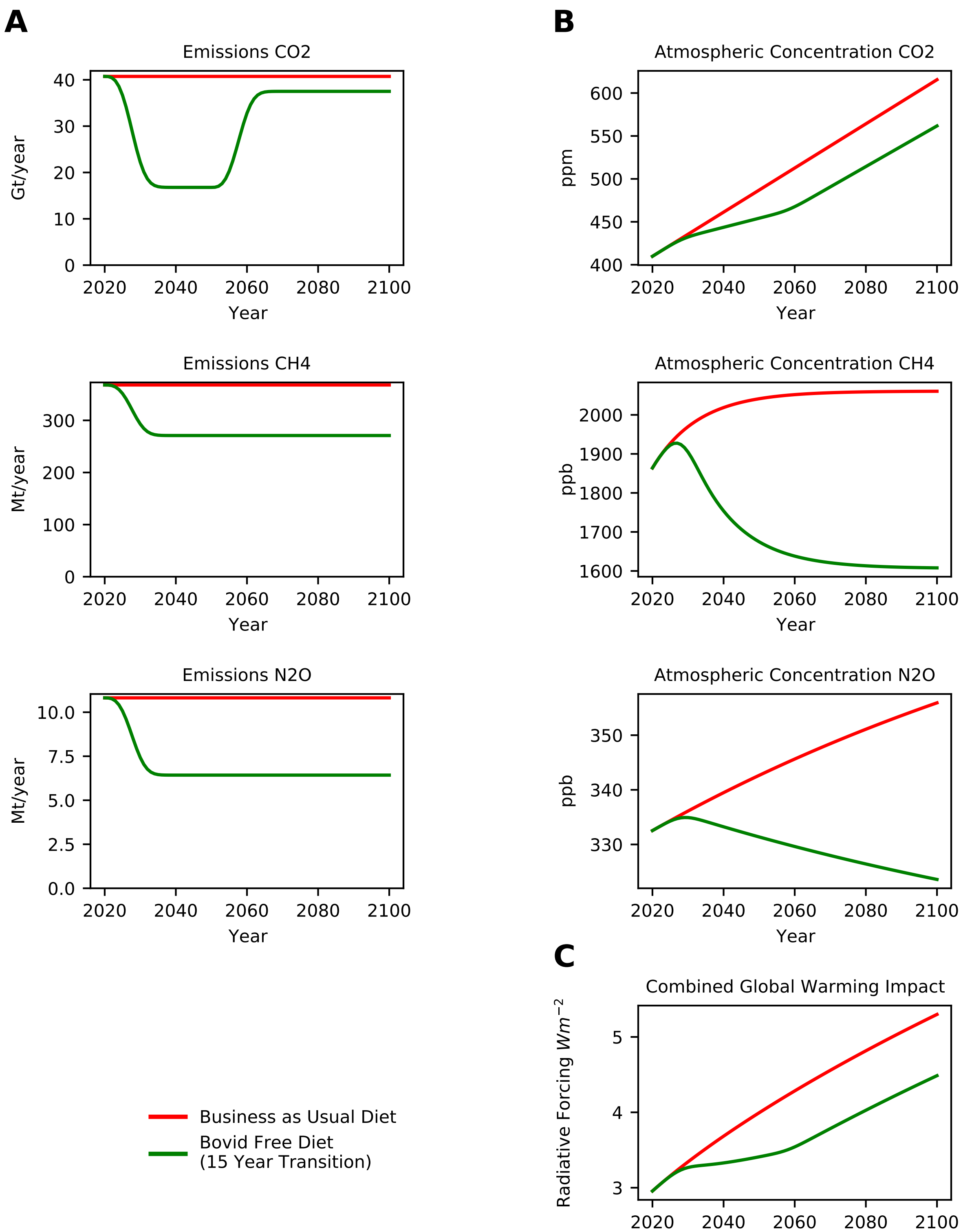


Figure 2-S4. Impact of bovid-free diet on atmospheric GHG levels.

(A) Projected annual emissions of CO_2, CH_4 and N_2O for Business as Usual Diet and Bovid Free Diet assuming a 15 year transition to the new diet and 30 year linear carbon fixation trajectory on freed land. (B) Projected atmospheric concentrations of CO_2, CH_4 and N_2O under each emission scenario. (C) Radiative Forcing (RF) inferred from atmospheric concentrations in (B) by formula of (Myhre et al., 1998; Ramaswamy et al., 2001) as modified in MAGICC6 (Meinshausen et al., 2011).

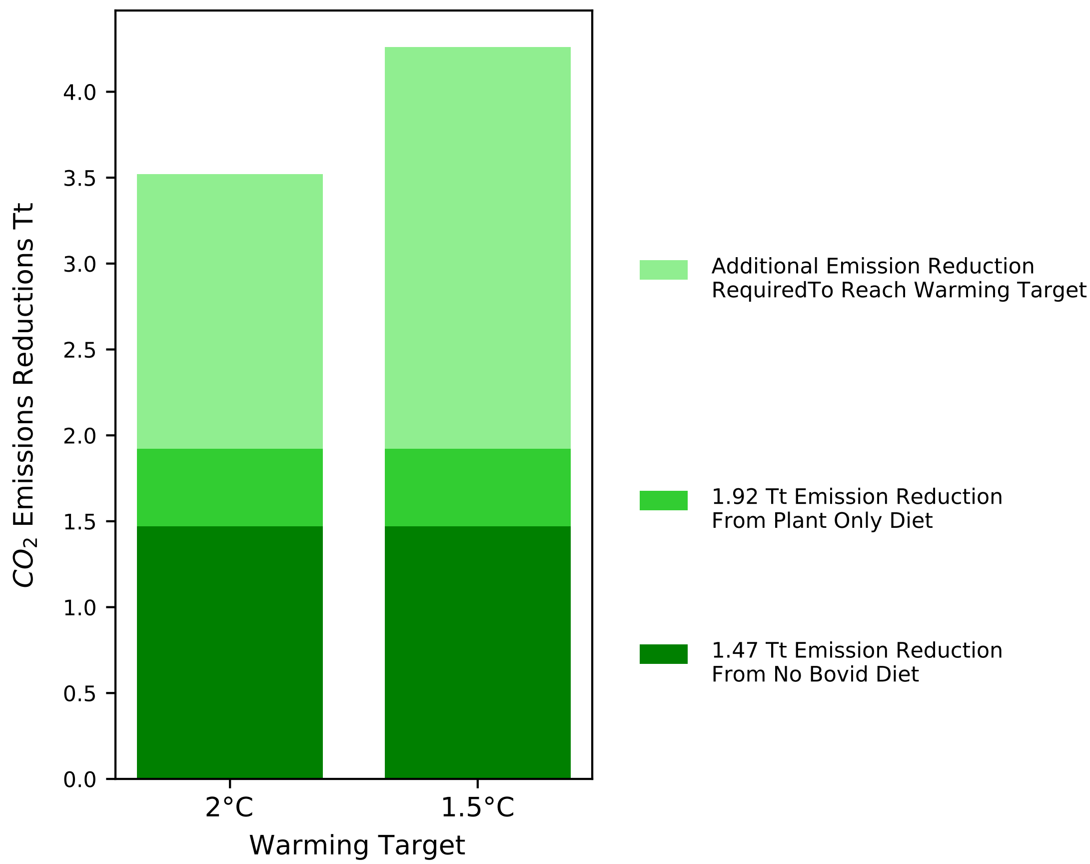
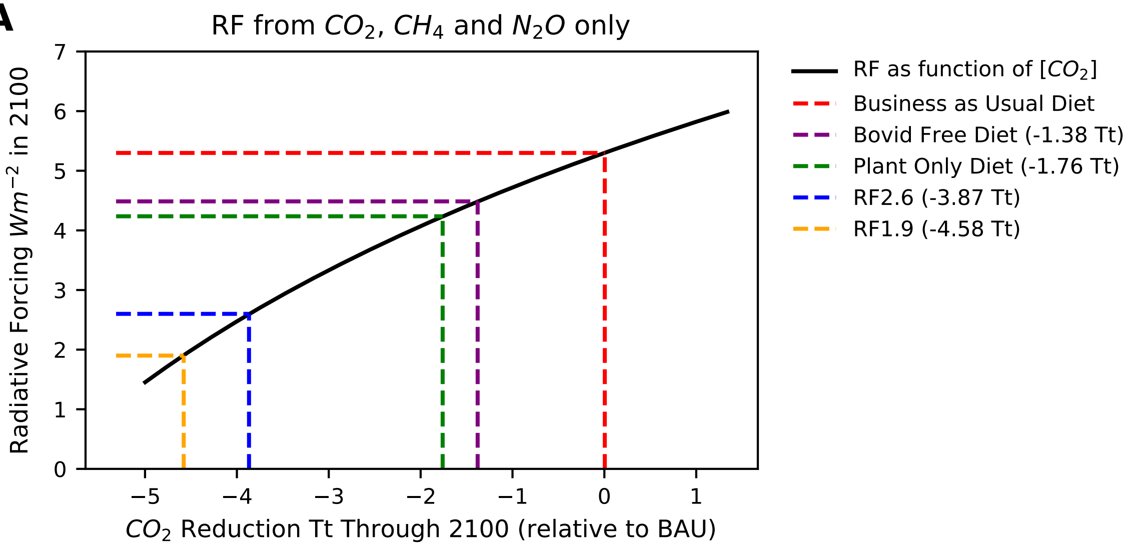


Figure 3. Significance of dietary transition in curtailing global warming.

Using projected CH_4 and N_2O levels in 2100 under business as usual diet as a baseline for RF calculation, we computed the CO_2 reductions necessary to reduce RF from the business as usual diet level of RF=5.11 to the bovid-free diet level of RF=4.19 (1.47 Tt CO_2), the plant-only diet level of RF=3.88 (1.92 Tt CO_2), the 2.0˚C global warming target of RF=2.6 (3.53 Tt CO_2) and the 1.5˚C global warming target of RF=1.9 (4.26 Tt CO_2). For this analysis we used a corrected RF that accounts for the absence of other gasses in our calculation by training a linear regression model on published MAGICC6 output to estimate from CO_2, CH_4 and N_2O levels the residual RF impact of other gasses.

A



B

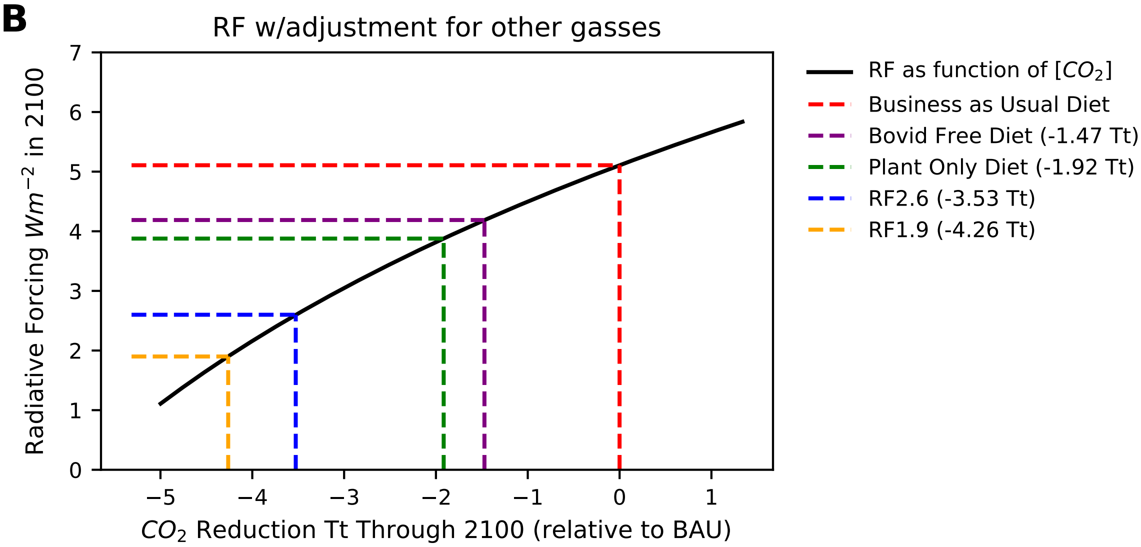


Figure 3-S1. Full carbon opportunity cost of animal agriculture.

We define the Emission and Land Carbon Opportunity Cost of animal agriculture as the total CO_2 reduction necessary to lower the RF in 2100 from the level estimated for a business as usual (BAU) diet to the level estimated for a plant only diet (POD). For these calculations we fix the CH_4 and N_2O levels in the RF calculation at those estimated for the BAU diet in 2100 and adjust CO_2 levels to reach the target RF. We also calculate ELCOC for just bovid sourced foods and determine the emission reductions necessary to reach RF's of 2.6 and 1.9, often cited as targets for limiting warming to 2.0˚C and 1.5˚C respectively. (A) Shows the results for RF directly calculated from CO_2, CH_4 and N_2O, while (B) shows an RF adjusted for other gasses using multivariate linear regression on MAGICC6 output downloaded from the SSP database.

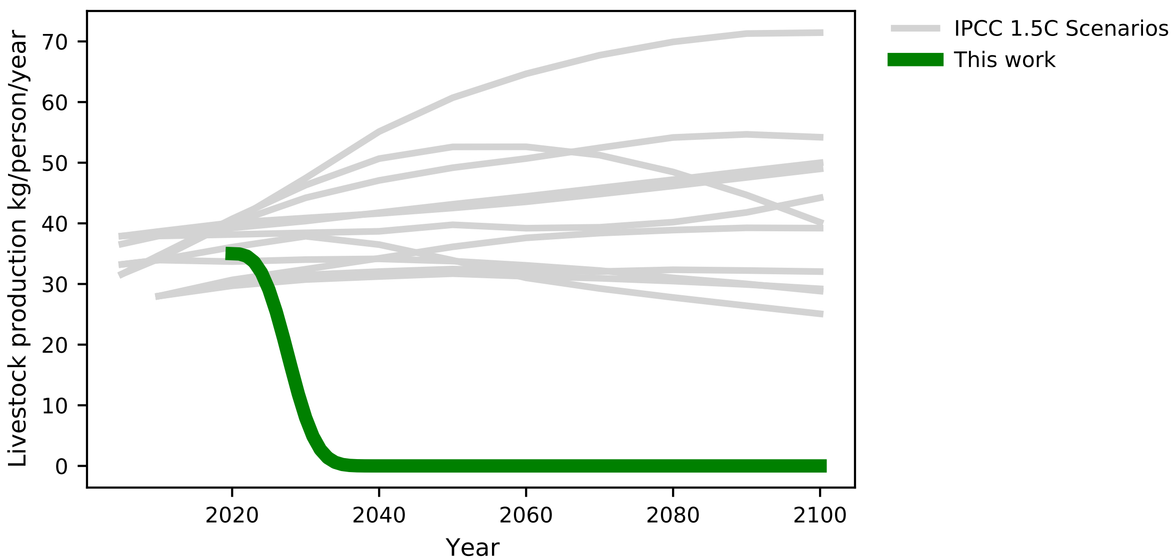


Figure 4. Projected per capita livestock production in SSP/IAM RF 1.9 scenarios.

We downloaded data for the Shared Socioeconomic Pathways (SSPs) (Riahi et al., 2017) from the SSP database (Version 2.0; last updated December 2018), and plot here the inferred per capita livestock production for scenarios meant to reach an RF target of 1.9 in 2100. While there is widespread acknowledgement of the impact that ongoing animal agriculture has on the climate, it is notable that most of these scenarios, which represent the most aggressive proposed mitigation strategies in this modeling framework, anticipate an increase in per capita livestock consumption, and none anticipate any significant reduction below current levels, in contrast to the complete elimination we propose here.