This manuscript presents a timely and relevant study that integrates a pasture-burning date algorithm into the LPJmL5 dynamic global vegetation model to assess the coupled impacts of fire and grazing on ecosystem carbon and nitrogen cycling in Brazilian grasslands. Using Chalumeau algorithm for climate-driven, management-based fire timing represents a valuable methodological advancement, particularly in regions where human land use plays a dominant role in shaping fire regimes. The paper is well-motivated, generally well-written that emphasize the interplay between grazing pressure, burning frequency, and biogeochemical feedback.
However, the study also has important limitations that should be more clearly acknowledged. Chief among these is the absence of any experimental or observational data used for model calibration or validation**,** despite the strong claims made about nitrogen and C: N dynamics. Additionally, several key biogeochemical processes—such as nitrogen recycling via manure and biological nitrogen fixation—are either under-described or not quantitatively supported. Such issues do not undermine the value of the study as a modelling exploration. However, they must be addressed more explicitly. Please see my detailed comments below for specific suggestions on how to strengthen the manuscript.

1.) Provide a supplementary table that lists every fixed parameter, its value, units, and reference/justification. This will satisfy transparency and help future users turn the feature on in standard LPJmL runs.

2.) In the nitrogen-budget discussion the authors state that nitrogen inputs “consist of BNF and atmospheric deposition,” and the decline in soil N under burning / grazing is “driven primarily by reductions in BNF. However, there is no description of how BNF is computed (symbiotic vs. asymbiotic, dependence on plant N demand, moisture, temperature, etc.) nor any parameter values.

   A) Include the key BNF parameters in the requested parameter table (fixation efficiency constants, maximum rates, etc.).
   B) If possible, show one sensitivity test (e.g. ±20 % maximum BNF rate) to demonstrate that the qualitative C: N conclusions are robust.

3.) Nitrogen cycling clarity - The current text never states what fraction of grazed N is returned as dung/urine or how urine is handled, calling the soil-N results into question.
   A. Give the exact fractions and pathways in Sect. 2.1.2.
   B. Cite a data source and show that the chosen value falls within the empirical 70–95 % range.
   C. Run a quick sensitivity test (e.g. +20 % manure-N return) and state whether conclusions change.

4.) This study does not use any experimental field data for calibration or validation. Its findings are based entirely on mechanistic simulations, and while it emphasizes the importance of future field research, it would benefit from moving that discussion into a dedicated ‘Limitations and Outlook’ subsection