

Biogeosciences Discuss., referee comment RC2
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Comment on bg-2020-464

Anonymous Referee #2

Referee comment on "Effects of elevated CO₂ and extreme climatic events on forage quality and in vitro rumen fermentation in permanent grassland" by Vincent Niderkorn et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2020-464-RC2>, 2021

The manuscript by Niderkorn and others explores the effects of climate change and extreme events on forage quality. They find that the effects of CO₂ fertilization and extreme drought on forage quality, especially the neutral detergent fiber:nitrogen (NDF:N) ratio, somewhat offset each other.

The interaction between climate change and plant chemistry is important to understand; many studies seem to only want to study production quantity and not nutrient quality. From this perspective the study is highly timely. At the same time, the text seems to be put together rather haphazardly. As one of very many examples, the word 'associated' appears twice in one sentence on lines 19-20. Starting at the first sentence, 'the natural one' sounds awkward; this sentence could be rewritten 'This study was aimed at analyzing changes in botanical and chemical composition and the in vitro rumen fermentation characteristics of an upland grassland exposed to elevated carbon dioxide concentrations and drought'. The text really needs quite a bit of work to become publication-quality and a simple automated grammar and language checker would go a long way toward improving the paper.

Section 4.1 demands a bit more explanation. How did the control treatment become drier and warmer than climatic conditions? On line 225, are the differences in digestibility due in (perhaps large) part to differences in species that dominated in the different treatments? The results section, which was rather terse, could benefit from more detail on species-level changes that may or may not have occurred in the experiment with large implications for digestibility. These findings need to be described in a bit more detail to help the reader understand if findings are dominated by plant chemistry responding to climate variability and atmospheric change, or simply by the plant community that was growing in the different treatments.

I feel that there is enough material here that is novel to warrant eventual publication, but readers will want to know why plant community chemistry has changed (see also Lee et al. cited on line 55). Is it the community, the chemistry, or both? The information is available and whereas the authors note minor differences in species (Fig. 4) there are

important differences among groups (Fig. 3) and I was not fully convinced - but could be - that these shifts make a minor impact on digestibility. Adding a relative abundance effect, or accounting for relative abundance to the statistics presented might help do so, or perhaps by simply expanding the results section to add more detail. Bonferroni corrections likely apply to the multiple statistical comparisons in Tables 1, 2, and 4. I recommend major revisions to the manuscript to help disentangle how plant community shifts may (or may not) help explain the results.