Response to Reviewer 4 Comments

Point 1: Introduction - In the last paragraph clearly specify and state the main hypotheses tested.

Response 1: In the last paragraph of the introduction, we state that the study *"investigated how differences in planting methods and N fertilizer rates reported by Malone et al. [37] impact forage quality for freshly harvested winter rye (fresh rye) grown in Central Iowa. We also investigated forage quality and potential revenue in a system where winter rye is anaerobically digested for RNG production, the digestate coproduct is sold as feed protein, and revenue is also generated from renewable energy and soil carbon credits. The digestate coproduct can be sold as feed protein because the digester system only accepts crop biomass and does not co-digest with manure, thus eliminating pathogen concerns. We also estimated the potential GHG emission offsets from fertilized rye in a bioenergy system."*

Point 2: Materials Methods - Please mention which normality and homoscedasticity tests did you run.

Response 2: We tested normality and homoscedasticity but used the Kenward-Rogers test implemented by PROC MIXED in SAS, which is robust to violations of assumptions, so adding additional information to the manuscript is unnecessary.

Point 3: Forage quality of digested winter rye and revenue from bioenergy and feed protein - Please to your discussion the impacts of the anaerobic digestion of the rye on the change of the microbial community, especially the change from predominant (aerobic) to anaerobic. Please answer how a change in the microbial community can affect ruminant's microbial community. Add also something about the archaea community in the digested, CH4.

Response 3: We appreciate this reviewer's comment and agree there can be changes in microbial communities with anaerobic digestion, which change under varying environmental conditions. However, we feel this is outside of the scope of this study. We did not conduct any metagenomic DNA sequencing or other taxonomic or functional profiling of microbial communities.

Point 4: Conclusion - Mention here also something about the microbial change in the digested compared to the fresh forage.

Response 4: We appreciate the reviewer's comment, given the importance of microbial communities in anaerobic digestion. However, we feel this is outside of the scope of this study. Future research could further explore microbial communities' role in the bioenergy system we discuss in this manuscript to optimize the digester's operating conditions, especially at the commercial scale.