

Interactive comment on “Long-term nutrient fertilization and the carbon balance of permanent grassland: any evidence for sustainable intensification?” by Dario A. Fornara et al.

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Please see here below in the attached PDF document our response to Referee 2.

Interactive comment on “Long-term nutrient fertilization and the carbon balance of permanent grassland: any evidence for sustainable intensification?” by Dario A. Fornara et al. Anonymous Referee #2 Received and published: 8 July 2016

The manuscript “Long-term nutrient fertilization and the carbon balance of permanent grassland: any evidence for sustainable intensification?” analyses changes in top soil C stock of 43 years of data from a permanent grassland experiment on organic fertilizer amendment (cattle and pig slurry in different application rates). The manuscript

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assess key questions such as: how long-term inorganic vs. organic fertilization influences soil C stocks, and how soil C gains (or losses) contribute to the long-term C balance of managed grasslands. The manuscript and data set is interesting and worth to be published. Furthermore the outcomes may give further insight of the effect of C amendment on soil C sequestration of managed grasslands and their latter role to compensate non CO₂-farm emissions. However, from the present version needs some clarification (details on plot experiment) on several points (see general comments) and I also encourage authors to look on the data set from different angle: e.g. 2D plot on yield vs. soil C changes (N vs soil C changes) and eventually a 3D (multiple regression) with yield /soil C changes/ N inputs , as this may give further information on slurry amendment thresholds with respect to yield and GHG emissions. Accordingly, I suggest to have (majors) revision before publication.

We appreciate the thoughtful comments of the reviewer, which we found very useful and helped us to further improve our manuscript. We have now added more information on N inputs from animal slurry. We agree with the view that there might be different, alternative ways to show the combined effects of multiple predictor factors. Here below we describe how we produced new graphs while searching for potential relationships between yields and changes in soil C. However, one aspect that we want to clarify immediately is that there is not any significant relationship between plant yields and changes in soil C ($R^2=0.05$, $F_{1,48} = 2.33$, $P = 0.13$, linear regression). The most important variable affecting net soil C changes is C inputs from slurry (Fig. 2b) as shown in the manuscript. Please see here below our responses to all points raised by the reviewer.

Please also note the supplement to this comment:

<http://www.biogeosciences-discuss.net/bg-2016-224/bg-2016-224-AC2-supplement.pdf>

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2016-224, 2016.

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