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Interactive comment on “Management, regulation and environmental impacts of nitrogen fertilization in Northwestern Europe under the Nitrates Directive; a benchmark study” by H. J. M. van Grinsven et al.

Anonymous Referee #1

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General comments:

The Nitrates Directive is implemented differently in the countries in Northern Europe, yet the farming conditions are fairly similar. It is therefore very important to make comparisons in order to improve our knowledge on measures to reduce the impact of farming on nutrient losses to the environment. This paper includes a lot of valuable information. However, the paper needs focusing. It is not clear what the main purpose is: To compare the measures under the Nitrate Directive? To compare the effect of different measure? To compare monitoring or data collection? To calculate nitrogen

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balances? To validate the MITERRA Model? or To point out challenges for EU and the Member States as stated in the abstract?

A clear purpose needs to be defined, and the following text and the title needs to be altered accordingly.

Specific comments:

It seems as if the authors consider the MITERRA model as the most correct way of calculating the nitrogen balances, without addressing the validity of the large number of standard values in the model, e.g. the fractions stated in table 2, the way of calculating the manure excretion from animals and the calculation of N removal by crops. It is suspicious that there are so large differences between MITERRA removals and the national estimates (table 12). Reading the abstract and the manuscript one gets the impression that the main focus was intended to be the problems of calculating the nitrogen balances. If that is the case more documentation ought to be included. If that is not the case less attention should be directed towards the MITERRA model. The paper refers to specific measures but it is not always clear what are mandatory measures and what are efforts of the individual farmer. For example: the fertilizer equivalents (FE) stated in table 9 and mentioned at page 7364 are mandatory measures. But the authors go on and talk about various ways of improving the equivalencies at page 7365 – this has nothing to do with the mandatory requirements but are means for the farmer to improve the actual efficiency of the organic manure. Also concerning nitrogen standards for crops, the authors need to be more precise in terms of mandatory nitrogen standards and recommended standards.'

Technical corrections:

P.7356, l 23: 'most Member States have implemented four actions programs' – I am not sure that this is correct? And how is a 'new action program' defined – new goals, new measures, new evaluations?

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P.7356, I 2: the reference ' Fraters et al.' – it sounds as if this reference is an EU study. This is not the case !!

P.7360: The MITERRA removal is compared to national and EUROSTAT data. The other critical data component is animal manure, the paper would benefit from a similar comparison.

P.7363, I 13: '...mostly apply to farms with at least 70-80% of farm land in use for grassland' - in Denmark the requirement is at least 70% of the area with roughage (fodder beet, grass or cereal /maize with catch crops).

p. 7365, I.26: 2nd and 3rd reporting period? At page 7358, I.8 the authors refer to the third reporting period with references from 2008.

P. 7367, I 20-25: here artifacts are caused by differences between periods within countries, I. 25-27: here artifacts are caused by differences between countries. This could be clarified.

p. 7368, I. 15-19: how are the above mentioned artifacts dealt with in this overall picture stated here?

p. 7369, I. 7-10: the difference between MITERRA leaching and groundwater should be explained. Furthermore - Figure 7 – what type of water is this – leaching or ground water?

P.7369, I 20: 'relatively low leaching fractions' – how valid are these fractions? It is very critical to point out risk areas based on this single value!

P. 7370, I. 25: 'nitrogen standards ... tend to be lower than the fertilizer recommendation'. 'tend' is not the correct term, the nitrogen standards are legally required to be lower the economic optimum.

p. 7371, I. 5-8: I do not understand this sentence – is it dealing with methods for comparing recommendations, or with methods for setting recommended N in order to

improve comparisons?

p. 7373, l. 22: 'Recent national census data indicate that since 2008. ...' This statement is too general – where is this published, is it valid for all countries, etc.?

p. 7375, l.9-24: here the authors make recommendations for improvement of harmonization and effectiveness of the NiD. This is too general and does not fit in here. If the authors believe their data give basis for making recommendation the focus of the paper should be altered substantially.

p. 7375, l. 29: 'non-point agricultural sources contribute 65 % to the N load to fresh water' – where does the remaining part come from? In Denmark 90% of the total load is from non-point agricultural sources.

p. 7377, l. l. 12: Why is 'harmonization of fertilizer recommendation systems needed' ? Please clarify.'

p. 7377, l. 23-26: '...., the NiD may need to be improved' – for what purpose? Please, clarify.

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