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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 #2

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General comments: Van Grinsven et al. provide a detailed overview of the implementation of the Nitrates Directive (NiD) in Northwestern Europe. The study is restricted to seven countries which are among the most productive in the EU in terms of agricultural production. It compiles large amounts of information and data attained from fragmented sources such as national reports from different stages of the NiD implementation. It compares very thoroughly the differences in agricultural structures, practices and national laws within the exemplary countries. In addition to the compilation of existing data, new results from a model application are presented and compared to

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balances published previously. Thus, this paper provides valuable data and new findings regarding one of the most important environmental issues of European legislation. It is well written and structured and of high interest for the scientific community. I recommend this article for being published after some minor changes that are suggested in the following section:

Specific comments: The authors compare the results from one model (MITERRA) to balances calculated on national basis or by EUROSTAT. Results of this comparison are given for whole countries (table 12). However, MITERRA was adapted on a regional basis (Fig. 7). This gives the opportunity to check whether the model results are reasonable and reliable. A short discussion of this aspect could support the conclusions drawn from the model application. One important point which is presented in chapter 3.4 are artefacts resulting from, e.g. different monitoring procedures or monitoring depths in different countries, which hinder a harmonized evaluation of the effectiveness of the NiD. This point could be stressed more strongly in the discussion or conclusion sections as one of the next required steps to improve the implementation of the NiD. Throughout the manuscript rates of application, leaching, etc. are given as kg ha⁻¹. Either it should be clarified at the beginning that these values are annual fluxes or the data should be given in kg ha⁻¹ yr⁻¹. p. 7364, lines 5-7: Can these percentages be calculated from values given in table 8? What are the relative values related to? This should be clarified. p. 7368, line 23: It is not clear what is the point in Figure 4. It is not much different to Figure 3. The main difference is that The Netherlands have changed to the top. p. 7368, line 28 – p. 7369, line 2: There is not much use in comparing slopes of the trends (maybe with exception of The Netherlands and Denmark) since the time series have different lengths and most are more or less equal to zero.

Technical corrections:

p. 7359, line 14: Delete “in” in “...N-losses in during housing...” p. 7360, line 21: Please specify what “N losses” includes. p. 7361, lines 1-3: How is the leaching fraction determined? Is that part of the MITERRA model? Table 2: - What is meant

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with “runoff fraction”? Is that surface runoff? Should be specified. - Header of third column: “waters” behind “small surface” is missing - Generally, the headers of the columns no. 2 – 5 are not clear. I guess what is meant is “Fraction leaching to GW + small surface waters”, “Fraction leaching to large surface waters”, “Fraction of surface runoff”

p. 7361, line 24: Define “LSU” (not mentioned before). p. 7362, line 8: Insert slash between “and / or”. p. 7362, line 18: Define “UAA”. p. 7363, line 14: Delete “for” in “. . .including for some—“ p. 7364, line: Change “. . .based in total N. . .” to “. . .based on total N. . .” p. 7365, line 16: Define “NVZ”. p. 7366, line 26: Delete full stop after “level”. p. 7369, lines 7-8: Delete “concentrations”. p. 7369, line 11: Correct word order in “. . .to tend be. . .” Table 3: Different formulations in caption (“ruminant meat + 0.1 x total milk”) and table (“0.1 x meat + milk”); What does that sum of meat and milk production mean? Please provide an explanation.

Table 5: EU-15: Presumably EU-12 is meant

Table 6: - Foot note 1: Word missing in “soil mineral N autumn”? - Foot note no. 5 appears after no.8 in table

Figure 7: Are these nitrate concentrations in groundwater or leaching water? This should be specified.

p. 7377, line 25: Sentence starting with “Perhaps” is not a full sentence. Maybe it can be linked to the sentence before.

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