

Interactive comment on “Nitrogen food-print: N use and N cascade from livestock systems in relation to pork, beef and milk supply to Paris” by P. Chatzimpiros and S. Barles

Anonymous Referee #3

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General comments

This paper presented by P. Chatzimpiros and S. Barles does a good job of quantifying the nitrogen flows in the beef, milk, and pig production process in Paris. The analysis connects ultimate food consumption with upstream nitrogen losses to the environment. Although it looks at average practices in the region, the analysis considers at multiple steps of the production process to determine where and how nitrogen losses occur. This type of information – especially when available for a specific region – can help inform consumers, producers, and more about the impact that food production can have. The approach utilized is logical and the data sources are generally appropriate

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and well-documented.

However, the paper does require some reorganization and additional information (specific suggestions can be found in the “Specific comments” section, below). For example, the flow of the article would be clearer if the discussion of the uncertainties precedes the authors’ discussion of conclusions. The authors should also more clearly report their major scientific findings from the analysis. More definitions and explanations are necessary, especially in the case of some of the assumptions, as modeling of this scale requires complex assumptions that can have a substantial impact on the results. The paper overall presents important, original findings, but some revision is necessary before a final publication.

Specific comments

1. The title is a little confusing with its use of the term “N cascade,” as the results presented describe the losses to the N cascade rather than an actual analysis of the N cascade. Instead, I would suggest the following title: “Nitrogen food-print: N use in and N losses from the production of the pork, beef, and milk supply to Paris.”
2. The abstract focuses too much on the methods; it does not provide enough information on why the study was done and what the major conclusions are.
3. The term “farm-gate” (1974/14) should be defined.
4. More background information on nitrogen should be provided. For example, the difference between unreactive N (N₂) and reactive N (all other forms) should be explained. I assume that when referring to nitrogen in this paper, the authors actually mean reactive nitrogen. This is fine, but should just be stated early on to avoid confusion. Some attention should also be given to the consequences of releasing reactive nitrogen to the environment to explain the importance and implications of this study.
5. The term “food-print” should be defined in both the abstract and the introduction.
6. The term “urban food-print” is also used. Is this different than a normal “food-print?”

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A definition would be helpful.

7. The term “N cascade” should be defined in the abstract, and it should be more completely defined in the introduction, especially if it remains in the title.
8. It would be useful to put the study in context for France, Europe, and perhaps the world. The analysis is very useful for the Paris region, but could the food production system results be extended to the rest of France? How different is the production from the rest of Europe?
9. An explanation of why the selected food products were the only ones considered would be useful. For example, why were chickens not considered while the two other major livestock types were? Are there plans to continue the analysis for other types of protein?
10. It appears that beef, milk, and pig supply to Paris were considered in their raw form, e.g. carcasses and fresh milk. Statement is made that “transformations” are not accounted for (1974/20); does this mean processing? I think it would be helpful to state this a little more clearly. Additionally, it would be useful to mention that raw food products require processing, which lead to additional nitrogen losses.
11. Was food waste considered? Substantial amounts of food waste (often over 30
12. The wording on lines 1975/8-10 would be more clear with the following: “. . . factors that underlie the environmental change caused by animal agriculture. . .”
13. Instead of the words “transportation database” (1975/21-22), “international trade database” may be clearer.
14. It would be helpful to more fully define the “perfect mixing principle” (1975/25).
15. Adding the word “feed” to “energy system” (1976/17) would help explain what is being described.
16. It is stated that 25

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17. The flow of the “Discussion and conclusions” section could be improved. To leave the reader with the authors’ conclusions, it would be preferable to discuss the uncertainties before the final conclusions are presented.
18. Both the abstract and conclusions would benefit from a more clear explanation of the authors’ major findings. This work has implications for personal food choices, for example that consuming one type of food would ultimately release less nitrogen to the environment than another type of food. The authors also spent some time discussing potential mitigation strategies, which could be better highlighted in the discussion as opportunities to reduce nitrogen losses.
19. The use of the term “a priori” (1984/14) is a little confusing; I think the term “inherently” would be better suited.
20. It is stated (1985/13-14) that “Farm dependency on imported protein is most generalized in pig production.” Does this mean it is most apparent or prevalent in pig production?
21. The following paper undertakes a similar analysis of N losses to the environment per unit of N consumption for different food categories: Leach, AM, JN Galloway, A Bleeker, JW Erisman, R Kohn, J Kitzes. 2012. A nitrogen footprint model to help consumers understand their role in nitrogen losses to the environment. Environmental Development, 1: 40-66. The loss factors calculated in the Leach et al. paper could be compared to those shown in Table 4 as “N losses per unit of N in animal products.” Note that the Leach et al. paper looks at average U.S. production.
22. Table 4 – What does “environmental efficiency” mean? Does it mean efficiency in terms of N use?
23. Fig. 4 – Why is the term “urban food-print” used here?

Technical corrections

1972/16 – Change to “livestock are”

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1972/14-15 – The units for N supply and N losses should have units kg N/cap/yr
1972/21 – Change “destined to” to “used for”
1972/23 – Change “for the majority” to “mostly”
1972/23-24 – Change “. . . environment and contributes to the N cascade which is. . .” to “. . . environment where it contributes to the N cascade, which is. . .”
1973/2-3 – Change “food demand drives at distance. . .” to “food demand drives most impacts relating to the alteration of the global N cycle from a distance”
1973/7 – the 1990s
1973/15 – change “systems” to “system”
1973/29 – a case study
1974/15 – livestock system
1974/18 – Change “losses . . . consequence” to “losses could enter the N cascade in consequence”
1974/18 – France,
1974/22 – Change “Those. . . which” to “However, those data report the location of the last loading of products, which”
1975/24 – grounds
1976/1 – In those cases,
1976/6 – Does “per capita” need to be in quotations?
1976/11 – consists of
1976/12 – systems, and
1976/26 – respectively,

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1977/23 – Replace “fabrication” with “production”
1977/28 – roughages,
1978/2 – Does “on-farm” need to be in quotations? Also at 1978/17
1979/5 – Soybeans are
1979/5 – . . . in the form of meals, and they generally originate from Brazil. . .
1978/9 – processing; for instance,
1978/15 – Remove “in addition”
1978/22 – Remove “In” from “In overall.” This should also be done for 1980/1
1978/24 – an identical
1979/1 – a percentage
1979/6 – the pig,
1979/15 – The nitrogen use efficiency acronym was already explained in line 1979/10 and does not need to be explained again
1979/23 – rotations;
1979/24 – a uniform rate
1979/25 – 170 kg N/ha,
1979/27-28 – Replace “but. . . simplification” with “but without precise data we were obliged to adopt this simplification.”
1980/2 – and summed up
1980/5 – leaching,
1980/11 – in the form of manures is calculated

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1980/13 – as an “exchange ratio”
1980/26 – assumed to be returning to surrounding
1981/2 – Replace “fragment” with “part”
1981/8 – Does “Gross” need to be capitalized?
1981/11 – after secondary
1983/20 – Replace “sustains” with “requires”
1984/10 – potential direct contribution
1984/26 – Replace “much” with “greatly”
1985/1 – It is confusing which livestock types the numbers refer to, since it is suggested that swine losses are 3x those of beef, but the corresponding number for swine is 3x smaller than that for beef.
1986/6 – Replace “pertain” with “remain”
1986/6 – Replace “relating to” with “of”
1986/28 – with a different
1987/2 – Replace “agrosystems of” with “agrosystems with a”
1987/11 – Replace “taste” with “choices”
1988/28 – Replace “be always” with “always be”
Table 1 – The units should all be in /cap/yr.
Table 2 – The (in front of and should be removed
Table 4 – The way the units are displayed is a little unclear; perhaps it could be stated in the title that all units unless otherwise stated are kg N/cap/yr

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Fig. 1, 2, and 5 – The text in the embedded legends is too small

Fig 6-9 – Are arrows in terms of relative magnitude? If so, it would be helpful to state that. However, if they are currently in terms of relative magnitude, it appears that some of the scaling should be modified. For example in Fig. 6, the bar on the bottom right with 0.27 is larger than the bar in the top right with 0.38.

Fig 6-9 – It should also be clarified that the units are /cap/yr here as well.

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