

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

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Received and published: 4 April 2012

General comments Using the case of Paris as an example, the paper presents a spatial perspective on the impact of urban meat and milk consumption on nitrogen flows in French and global agro-ecosystems. The paper applies the urban food–print methodology and expands the method to specifically capture nitrogen flows (the Nitrogen food print) associated with urban food consumption in the producing hinterland. Nitrogen flows are calculated on the basis of (regional) statistical information on agricultural production systems and feed ration models to quantify the amount and composition of feed supply. The paper presents a wealth of empirical results: It addresses spatial issues

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of urban supply, differences in land requirements and nitrogen flows between animal products and uses a range of different indicators to discuss Nitrogen flows and use efficiencies. It shows where N losses occur, offers possibilities to reduce these losses and to increase overall Nitrogen use efficiency of the livestock system. In general the paper is well structured, written and referenced and fits very well into the special issue and the Journal. However, amidst all the empirical results, it remains somewhat unclear what the authors consider the major findings of their work. The paper could be a bit more specific and focused here; in this context, the introduction and the discussion/conclusion section should be better matched. The paper is a valuable contribution to the study of nitrogen flows and to the attempt to better link issues of (urban) consumption and production; it presents a new approach and the empirical analysis is solid; it should be published with some revisions!

Specific and technical comments

In its current version the abstract focuses very much on methodological issues. It should, on the one hand mention the N-food print (and also N cascade) as the key concept used in the paper and on the other also address why such a perspective on urban consumption is relevant and provide a sentence concerning the most important finding.

1973 and 1974: The paper introduces the concept of the Nitrogen food print. This concept is obviously based on a method referred to as food print (1974/13). This concept is not generally known and it should briefly be introduced in the introduction section: What does it allow to capture, why is this approach chosen for investigating N-flows; what is the basic principle in its calculation? Based on this the concept of the Nitrogen food print can be introduced as a refinement or specific adaptation of this method.

The introduction should outline more specifically which research questions will be tackled in this paper and by developing and applying the N food print method in a way that

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matches the findings discussed in the discussion and conclusions section. This should specify the more general introduction into the significance of urban consumption and global Nitrogen flows which is provided in the current version. This could also help to focus the paper, which now presents a large amount of empirical results and addresses several different issues (differences between N-efficiency of different food products; spatial aspects of urban supply and the location of environmental pressures; how to optimize N flows in production systems in order to minimize losses; optimizing urban consumption patterns.)

It is not always clear if the calculations presented in the paper rely on region specific information or if national averages were used: It is, for example, unclear if per capita consumption ratios in Paris are derived from national averages (e.g. from national food balances) or if these are data specific for Paris. Also for milk yields it is unclear if region specific yields (1977/3) have been used or if only a national average (Table 2) has been applied! What are the limitations of using average values instead of region specific values that take into account differences between intensive or extensive production systems?

After all the empirical results it remains somewhat unclear what the most important findings are! Conclusions mainly address improvements of N losses in the production side (feed rations, crop production, manure management). These are important findings, but they would actually not necessarily require the effort to link urban consumption with production in an N-food print. Are there any conclusions to be drawn with respect to urban consumption and supply patterns?

Title: The title features “N cascade” – a term which needs to be explained in the introduction.

1974/3: This is the only methodological reference on how consumption in Paris was calculated. This issue should also be addressed in the methods and data section; were national per capita averages used to calculate food consumption in Paris? Which

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concept of consumption is used here (apparent supply vs. final consumption!)

1974/10: feed imports either from crop farms in France or from abroad; unclear what is meant by . . . results in livestock systems being spatially clustered. . . Please explain!

1974/12: we specify these systems? Which systems does this refer to? E.g. In a third step we quantify the size and the geographic location of the food supplying crop production systems using data on national and international feed trade and crop yields

1972/17: to what densities livestock is reared. Unclear what this means!

1972/24: what does Nr stand for? Please provide explanation

1978/18: I would not use the term “carrying capacity” in this context. The term is used in deferent ways in ecology and sustainability science and is confusing. Rather say something like “feed production capacity”

1979/2: Does it make a big difference if the main and by-product allocation is done on the basis of energy content or on the basis of product price (value of soy oil vs. value of soy meal)?

1979/20: What does BNF stand for?

1980/11: “manure is” instead of “manures are” (several times in the text)

1980/11 ff: As far as I understand it, manure output was calculated on the basis of information on the area where manure is applied and an average application rate per ha and NOT on the basis of livestock numbers and annual manure production per head. This is a bit confusing and it is not fully clear why an approach independent of livestock numbers has been chosen. Maybe the notion of “output to crop agriculture” is what is not clear enough!

1983/13: . . . contribute in manure being produced. . . not proper English

1983/15 lost to the environment

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1983/20: It is argued that one unit of animal protein sustains the production of 1.7 units of vegetal protein. This is an interesting (and also confusing) finding which is hidden here. It requires more explanation and deserves some discussion.

1985/5: ..are on crop farms. . .

1985/10: . . .Brazil: more this dependence is high and more. . . . Sentence unclear, not proper English

1985/25: I would not use the term “underestimate” here (the differences in results are due to different system boundaries chosen); better e.g.: as a result, Jarvis arrives at much lower loss to product ratios compared to this study. . . .; Interestingly the deviation is quite similar for beef and dairy production, but very high for pork; is this due to the high dependency of pork on feed concentrates?

1987/11: Why are “social factors” mentioned here explicitly; “taste for manure” sounds strange; reformulate the sentence! Terminology of feed and fodder: It should be mentioned that the term fodder is used in an inclusive sense, including roughage, grazed biomass and market or concentrate feed (e.g. feed grains, soybean meals).

Table 2: units are wrong. Should be l or kg/day and not year!

Interactive comment on Biogeosciences Discuss., 9, 1971, 2012.

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