Author’s response to reviews

Title: Reducing our environmental impact and increasing our health: greenhouse gas emission and land use of usual diet and mortality in the EPIC-NL cohort

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Author’s response to reviews: see over
“Reducing our environmental footprint and improving our health: greenhouse gas emission and land use of usual diet and mortality in the EPIC-NL cohort”.

We thank both reviewers for their valuable comments on our paper. It has helped us to improve the text. See below our answers (A) to the comments and questions of the reviewers (Q). In the revised manuscript, the changes are highlighted in red (directly in the text using a red font).

Reviewer #1:

Major revisions

Q1: This is an important study - but it could still be improved. The study needs to make it clearer in the Abstract and Conclusions etc, the context of the Dutch diet – ie, a Western diet which is relatively high in meat and dairy products and refined carbohydrates and is relatively low in vegetables (from a health perspective). Then within this dietary range of the studied cohort – there was no significant association between diet and GHGE and land use. That is, the finding of no association probably largely reflects the lack of heterogeneity of dietary intakes in this cohort. With such context and interpretation – it will avoid a potential misinterpretation by readers who could initially interpret the findings as there being no value in dietary change as a way to reduce environmental impacts.

A1: We added, as the reviewer suggested, more context information about the type of diets in our cohort population, i.e. the Western dietary pattern. In both the abstract (the background section) and the concluding section on page 15, it is emphasized that the Dutch diet is relatively high in animal-derived food products and refined carbohydrates and low in fruit and vegetables. Within this dietary range there was no significant associations between overall daily dietary GHGE and land use and mortality. Throughout the discussion, but especially in the second paragraph we explain why an environmentally friendlier diet is not necessarily a healthier diet or vice versa. We hope that the revision made based on all comments help to aid this conclusion. Because there is value in dietary change as we can see from our modelling results.

Q2: This study is both a study of a cohort, but also includes a modelling study component (regarding the meat substitution). So to make the latter aspect much clearer – the word “modelling” should be used in various places (so that it is very clear to readers that it is hypothetical exercise).

A2: We agree with the reviewer that both analyses have a different theoretical background and that results should be interpreted accordingly. Throughout the document, we added the word ‘modelling’ to make clear this is a hypothetical exercise. In the abstract, methods, results and discussion sentences were adapted. In the abstract and conclusions, we mention now both the modelling and the hypothetical reduction to make sure this is clear for everybody at first glance.

Minor revisions

Q3: Abstract – it would be good to add more context for the 35g meat substitution (ie, that this is a one-third reduction relative to the usual 105g/d intake).

A3: We thank you for this suggestion to make the abstract more complete. A sentence has been added to the methods section of the abstract to indicate that we calculated a one-third reduction (35-gram) relative to the usual intake. This question and answer link to the question and answer 5 and 6.
Q4: Explain if the LCA included food wastage in the home (and if not then add this to the study limitations). This wastage can be quite substantial for many foods as shown in this UK study: WRAP. (2009) Household food and drink waste in the UK Banbury: The Waste & Resources Action Program (WRAP).

A4: Our LCA analyses included food wastage in the home as well. We are aware of the great impact of avoidable waste in consumer households. In the ‘dietary and environmental impact assessment’ section, we added avoidable and unavoidable (inedible parts) food waste at home to the description of the LCA.

Q5 and 6:
It is not clear why the modelled substitutions were just by food weight – rather than dietary energy. This should be explained (it is mentioned as a limitation, but more is needed). Line 202 “while responsible for 3.6% of daily intake weight, total meat …” – a more relevant comparison is the daily dietary energy contribution – as people eat for energy more than “food weight”. There is also the issue of eating meat for protein – perhaps this could be discussed – though probably this cohort has protein intakes considerably in excess of nutritional requirements.

A5 and 6:
The average total daily meat intake in EPIC-NL was 105 gram (standard deviation: 55 gram) and current dietary advice of the World Cancer Research Fund the Dutch Nutritional Centre and is 70 grams [1, 2]. Therefore, the substitution portion was set at 35 grams. For realistic scenarios, we substituted with the same food weight and not with the same amount of dietary energy. For example, in case of applying iso-energetic substitutions, an additional 300 gram of vegetables needs to be consumed to compensate for the energy intake of 35 gram of meat. Another argument for substitution based on weights is that is that a large part of the adult Dutch population is overweight (NL de maat). This suggests that energy intake is high compared with energy requirements. The reference to the 3.6% might indeed be less relevant in comparing food products on intake in gram per day. However, in order to present a clear picture in which also sugar-free soda is incorporated we choose this representation of the daily intake. In addition, it serves to highlight the skewed balance between GHGE per gram products. We will now present the energy contribution of meat (10.5 en%/d) right after the 3.6% g/d to give the reader an estimation of the importance of meat intake in our cohort. The issue of eating meat for protein is less relevant for the Dutch population. The Dutch overall population consumes 12-16 en% of protein (Dutch Food Consumption Survey). Recommended daily intake of protein is around 10 en% (Dutch Health Council) for the general population. Thus, a possible small reduction in protein intake is not a disadvantage in our cohort population.

Q7: Line 207 – make it clearer – that this is “higher” activity level

A7: We have added the word ‘higher’ to reflect the higher activity levels in participants in the highest quartiles of GHGE and land use.

Q8: Line 289 – what does “(data BC)” mean? Need to be more clear?

A8: In the methods section we describe that Blonk Consultants (BC) calculated our environmental data for food items. We now understand that this abbreviation is not likely to be remembered during the reading of this manuscript. Therefore, we have written Blonk Consultants full out instead of BC in the discussion.

Q9: Lines 290-291 – explain why, eg, concerns about the lack of sustainability of ocean fishing practices.
A9: Fish consumption is also associated with endangerment of several species, old ships, and damaging techniques to catch the fish. We summarized this as ‘controversial from the ecological point of view’. We now added the concern of sustainability aspects in current fishing practices to elaborate more on this topic.

Q10: Line 325 “empathize” – should this be “emphasise”?
A10: The reviewer was right that the used word was incorrect. We replaced the word.

Q11: References – improved re appropriate capitalization of journal names etc.
A11: A quick scan through our Endnote file learned that some references were not entered correctly. We changed the references that were incorrect to reflect the proper journal names.

Discretionary revisions


A12: We thank the reviewer for his suggestions of other publications in the field of nutrition, health, and environment. In the introduction, we add more information to the part of Scarborough et al 2012. In addition, we have included two studies (Vieux et al and Hoolohan et al) for better coverage of the literature. Furthermore, we have added a section in the discussion about government decisions on health and the environment of dietary intake. We added papers of Wilson et al and Briggs et al in this section. In this way, we also implemented the suggestions of the reviewer as mentioned in Q15.

Q13: The 35g substitution is a fairly modest level (a one third reduction in daily meat intake). The ideal would be to include scenario analyses around 50% and 100% reduction in meat. Also given that the hazard to health from processed meat seems to be much greater than non-processed meat – then just eliminating just the former would be another a worthwhile scenario analysis. This is a bit of extra work – but would add quite a lot of useful information to the paper.

A13: We agree with the reviewer that a one-third reduction is only modest. However, in respect to current meat intake and given the current recommended daily intake the 35 gram per day reduction is both more relevant for the Dutch population and more realistic to achieve. In the Western population like the Netherlands, such a change (50-100%) is very unlikely to occur. We are aware that the current hazard predictions are higher for processed than for non-processed meat. We now mention this in our discussion (line 310-311).

Q14: The paper could be a bit stronger if the Discussion had more context – eg, would the various substitutions for 35g of meat typically be cost saving or not in the current Dutch context (eg, maybe the fish substitution would increase the cost?). Considering the food security issue might be relevant to low-income Dutch citizens – so the cost aspect could be mentioned as being desirable in future research work.

A14: It is a good suggestion that reducing meat intake would usually be cost saving. However, the current paper is concerning the association between environmental factors and health and the effect of meat substitutions on health and environmental factors. We believe that the cost-saving aspect of this substitution is a very interesting topic but not within the current scope of our article.

Q15: The Discussion could be stronger if it indicated that governments wanting to promote population health (and save healthcare costs), and lower the environmental impact of food production could consider various options: • Food labelling requirements that indicate GHGE levels per 100g of food (perhaps a color-coded / traffic light or star system). • Food taxes where the tax level considers not only the health hazard (levels of sugar, salt, saturated fat...
etc), but also the environmental impact. • Media campaigns to inform consumers of the environment impact of various foods.

A15: We thank the reviewer for his idea to create a stronger discussion in our manuscript. As described in our answer on Q12 we added a section about government decisions and possible effect of taxes on high impact environmental food products, costs and efficacy. Furthermore, we added a part to ‘future research’ section of our discussion in which we highlight the importance of more research on communication strategies for sustainable and healthy nutrition, tax systems and food labelling opportunities.

Reviewer #2:

Minor revisions

Q1: Second paragraph of background: Please define or clarify features of “Western diet” and “American diet”.

A1: We agree with the reviewer that although the ‘Western’ diet is a well-established dietary pattern, for clarity of the meaning in our study we added some general statements about the food groups that are associated with the Western dietary pattern. Later in that paragraph, we used ‘American’ diet to label a Western diet. Because they are very similar, we exchanged ‘American’ for ‘Western’.

Q2: Third paragraph of background: Please elaborate diet recommendation in the Dutch Dietary Guidelines.

A2: We included the most important guidelines from the Dutch Dietary Guidelines, i.e. a varied diet with high intakes of fruit, vegetables and whole-grain cereals. We included a reference to these guidelines, in Dutch with an English summary, for more detailed information on these guidelines.

Q3: Third paragraph of background: What are the “three diets” for which the health effects were modelled?

A3: We agree with the reviewer that our current description might be a bit too short. We only mention that a diet with high reductions in meat and dairy is best for health and GHGE reductions. To be able to compare the modelled diets we now added a more detailed description of the three diets and their GHGE reductions and health effects.

Q4: Fourth paragraph of background: Please define or explain what “sustainable diet” is.

A4: That phrasing is indeed unclear. We meant to state that we want to investigate whether a relatively more sustainable diet is also healthier. We added the word ‘more’ before sustainable to better reflect this relative association.

Q5: Second paragraph of study populations: For me, it is unclear how energy requirement is estimated as mentioned in “the ratio of energy intake over energy requirement”. I hope “energy intake” was based on the FFQ. But it is not explained how energy requirement was calculated.

A5: In EPIC-NL, the energy intake is indeed based on the food frequency questionnaire data. Energy requirement is based on estimated basal metabolic rate (BMR). BMR is estimated based on age, gender, weight and height. We added this information to the study population section.

Q6: In the section of participants’ characteristics: “weight by height squared” instead of “height by weight squared”.

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A small mistake is easily made and easily overlooked when reading the manuscript. We thank the reviewer for his attention for detail. We have changed the order of height and weight to reflect the proper body mass index calculation formula.

1. [www.voedingscentrum.nl]