1. Original

We add a photo, for which we have permission to share it with you. It would be fine as long as whatever context it is used it does not offend the sensitivities of the people of this great country. I have the privilege of working in (Director India, Aviagen). The photo is from India. We would be able across IPC to find more photos.

2. Original

Guidelines as a whole. The document is very interesting and useful to guide and standardize LCA studies dealing with agricultural products. In my opinion, these guidelines should become for LCA the equivalent of the IPCC guidelines for GHGs. As stated in the document the method is not fixed and will possibly evolve in the future, but this is not incompatible with the standardization of LCA calculations in agriculture. Standardizing the calculation methods is crucial since it is the unique possibility to be able to compare LCA studies.

3. Original

Part one is very informative but the presentation could be improved for clarity. Sometimes sections are either confusing or maybe not needed.

4. Original

Part two presents good explanations and definitions and is very useful. As a general comment part 2 is certainly most important for practitioners since it gives the calculation method. It should be presented first to make the guidelines more “attractive” which, in turn, would greatly help with a wider adoption and use. We acknowledge that it is not an easy task and some explanations have to be given first. So, a possibility is to develop and provide a “summary for practitioners” based on the detailed guidelines. This document would summarize Part 1 (with figures, bullet points, references to main document, etc.) and would mainly focus on Part 2 and the method of calculations (chapter 11). The first section (chapter 7 to 10) could also be presented as bullet points. Again, the idea is to go straight to the calculations because, that is what the users will want to see first; explanations come after when questions arise after reading the method of calculations. Another possibility is to start using this method with the FAO database FAOSTats and publish them in scientific journals. Inputs that can only be obtained at the farm level would not be included and all the potentialities of the guidelines would not be presented. Nevertheless, there would be important benefits such as: 1- to demonstrate the use of these guidelines, 2- to either correct inconsistencies or to improve some calculation pathways if needed, 3- to show the importance and relevance of these guidelines through examples and 4- to start developing references at the national level. Indeed, it is the approach that our team used with the ULICEES model (Verge et al 2012) to calculate the carbon footprint of the main agricultural commodities. Another outcome obtained from such country studies could be the development of an online calculator. As we interpret this recommendation, the “road test” phase of the LEAP program, which has been discussed at the SC will meet the needs described. But a full restructuring of the document is not practical at this stage in its development.
5 Original Revised xi Glossary Attributional TE WEIDEMA This is not a definition. Use the one from the “feed supply chains” document, or the more authoritative one from UNEP/SETAC Shonan Database Guidelines: “System modelling approach in which inputs and outputs are attributed to the functional unit of a product system by linking and/or partitioning the unit processes of the system according to a normative rule.” Change to: “System modeling approach in which inputs and outputs are attributed to the functional unit of a product system by linking and/or partitioning the unit processes of the system according to a normative rule.” or use the same definition as in the “feed supply chains” document: “process-based modelling intended to provide a static representation of average conditions, excluding market-mediated effects”.
Adopt feed guidelines definition
SECRETARIAT: UNEP SETAC Life cycle initiative definition adopted

6 Original Revised xi Glossary Boundary TE WEIDEMA The definition here is equal to that given for “System boundary” Delete
Adopt proposed change

7 Original Revised xi Glossary Carbon dioxide equivalent TE WEIDEMA “impact” is too unspecific Change “impact” to “accumulated radiative forcing over a specified time horizon”
Adopt proposed change
SECRETARIAT: ISO definition adopted

8 Original Revised xi Glossary Carbon storage TE WEIDEMA term is not used in the document Delete
Adopt proposed change

9 Original Revised xi Glossary Consequential LCA TE WEIDEMA The A in LCA stands for Assessment. Thus, LCA Assessment is a pleonasm. Also, the assessment is not necessarily on different choices, but can be on “a” choice. Change to “Consequential LCA describes how relevant environmental flows will change in response to a decision.”
Adopt proposed change
SECRETARIAT: UNEP SETAC Life cycle initiative definition adopted

10 Original Revised xii 20 Glossary Cull bird Impoverished description IPC Diseased or injured birds which are euthanized for animal welfare or health reasons before the end of the normal productive period. These animals are disposed of and do not enter the human food supply.
Birds which are euthanized before the end of the normal productive period. (These may include birds that are diseased, injured, defective (ex: physical abnormalities, etc.) or those that do not conform to the expected breed or production standards (ex: stunted growth; non-laying hen).) These animals are disposed of after euthanasia.
Adopt proposed change; but retain the caveat about not entering human food chain

11 Original Revised Xi Definition of feed conversion ratio recommends the inclusion of feed additives respectively specialty feed ingredients (SFIs)
Definitions for feed conversion ratio include the inclusion of feed additives respectively specialty feed ingredients (SFIs)
Recommend no change; FCR may be affected by additives, but the definition does not depend on additives, etc.

12 Original Revised xi Glossary Containment and packaging TE WEIDEMA Would it not be more reasonable to call this term “Retail packaging”? Change the name of the term defined here to “Retail packaging”
Adopt proposed change

13 Original Revised xi Glossary Co-production TE WEIDEMA This is not the normal usage of this term. Co-production is normally understood as encompassing both joint production (as defined here) and combined production, where the co-product outputs can be individually varied. Without good reasons, definitions should not deviate from normal usage.
Delete the second sentence.
Adopt proposed change
14. Original Revised xi Glossary Co-product TE WEIDEMA It is probably not intended that wastes and emission outputs should be included in this definition (see definition of "Output"). Co-products are normally understood as product outputs, whether goods or services. Without good reasons, definitions should not deviate from normal usage. Change "Output" to "Product" and delete second sentence. ISO definition adopted

15. Original Revised xii NA Glossary Free-range eggs te IEC Last sentence incorrect with the term "outdoor" used. "They are also provided with indoor floor space, nest space, and perches." Adopt proposed change. The first phrase.

16. Original Revised xii NA Usual Glossary Layer / Laying hen te II/EC Definition should be worded better. "Best producing eggs for human consumption" or "Best kept for production of eggs intended for human consumption" adopt proposed change

17. Original Revised xii Glossary Joint production TE WEIDEMA This is the definition of combined production. Joint production is when the products cannot be independently varied. Change the name of the term defined here to "Combined production" adopt proposed change

18. Original Revised xii Usual Glossary Life cycle inventory TE WEIDEMA If this is only for a unit process, rather than for a life cycle (product system), then the appropriate term would be "Unit process inventory". Change the name of the term defined here to "Unit process inventory" ISO definition of LCI adopted

19. Original Revised xiv Glossary Primary packaging materials TE WEIDEMA This definition is unclear and not in line with normal usage. Primary packaging is normally understood to be the packaging that is directly in contact with the product, as opposed to secondary packaging. Packaging, both primary and secondary, which reach the consumers is called "retail packaging" as opposed to "wholesale packaging". Bring definition in line with normal usage. Change to: Packaging in direct contact with the product. See also Retail packaging (need to add this term with definition)

20. Original Revised xiv Glossary Process centre TE WEIDEMA This term is not logical and not in general use. Change the name of the term defined here to "Repackaging facility" adopt proposed change

21. Original Revised xiv Usual Glossary Product parts TE WEIDEMA This term is not precise and not in general use for this definition. Change the name of the term defined here to "Retail cuts" adopt proposed change

22. Original Revised xiv Glossary Product(s) TE WEIDEMA The purpose of the second sentence is unclear. Delete or clarify delete

23. Original Revised xiv Glossary Proxy data TE WEIDEMA Text is unclear. Change "in an LCA for a product produced" to "as input to a production process located" Definition expanded.

24. Original Revised xiv Glossary Removal TE WEIDEMA The term removal is also used in other meanings in this document. Change the name of the term defined here to "GHG removal" adopt proposed change
Stakeholders: Comment (*justification for change of technical aspects must be supported by either scientific literature or technical documents*).

25. **Original** Revised xv N/A Glossary Spent hen 1e IEC Definition should be worded better. “Adult female bird at the end of its productive life” see line 26

26. **Original** Revised N/A N/A Glossary New 1e IEC Recommend to add in the glossary a definition for egg grading, egg processing and egg products. I can suggest some definitions to the TAG leader if this comment is accepted. These have been adopted; see revised text.

27. **Original** Revised xv 30 Glossary Spent hen Old definition IPC Definition is limiting as it doesn’t include roosters at the end of the flock. Term: End of lay poultry Definition: Adult poultry at the end of their productive life (can be rooster or hen) adopt proposed change

28. **Original** Revised xv 31 Glossary Stocking density IPC Defined as “Spatial volume occupied by poultry” and should include how this volume is defined since this will vary for species and poultry purpose. Spatial volume occupied by poultry (usually defined by number of birds per space (birds per sq. meter) or by weight (kgs per sq. meter). Replace with: Area available to poultry, normally defined as birds per square meter, or on a weight basis as kgs per square meter.

29. **Original** Revised xv Usual glossary Secondary data TE WEIDEMA The NOTE appears to suggest that secondary data are always of lower quality than primary data, which is not always the case. Add “or of lower quality” after “not available” adopt proposed change

30. **Original** Revised xv Glossary Secondary packaging materials TE WEIDEMA Without good reasons, definitions should not deviate from normal usage. What is defined here is normally called “wholesale packaging” as opposed to “retail packaging”. Secondary packaging is normally understood to be the packaging that is not directly in contact with the product, as opposed to primary packaging, irrespective of whether it reaches the consumer or not. Change the name of the term defined here to “Wholesale packaging” Change to: additional packaging, not contacting the product, which may be used to contain relatively large volumes of primary packaged products or transport the product safely to its retail or consumer destination.

31. **Original** Revised xv Usual glossary Stocking density TE WEIDEMA Density must be expressed as a ratio. Change to: “The number of poultry per spatial volume” Revised per IPC recommendation, above

32. **Original** Revised xv Glossary System boundary TE WEIDEMA Without good reasons, definitions should not deviate from normal usage. The definition provided is a definition of the criteria for setting system boundaries, not the system boundaries themselves. Change to “The boundary between the activities included in the system and the system environment” ISO definition adopted

33. **Original** Revised xv Glossary Unit process TE WEIDEMA The last sentence represents only one possible LCI model (the attributional) and is not part of the definition of a unit process. Delete the last sentence ISO definition adopted

34. **Original** Revised xv Glossary Volatile solids TE WEIDEMA The second sentence is not fully correct. More precisely, the VS is the part of the sludge that is combusted at 500°C after 2 hours. Delete second sentence or clarify. Amend with: VS is measured as the fraction of sludge combusted at 500°C after 2 hours.
35 Original Revised 2 27-28 2 2.1 Ge IHP- FEFANA The expansion of the scope to AP and EP beside GWP should be an option for the future, it should be mandatory, because the nitrogen based emissions are somehow of more importance than the CO2-related impacts. Expansion of the scope should be mandatory. This is planned for the future, however, was not possible to include in the current scope.

36 Original Revised 2-3 29 page 2 to 26 page 3 Chapter 2 (Scope) Paragraph h-4 French Ministry of Ecology, Sustainable Development and Energy Guidance on the evaluation of additional impacts exists at French and European level, cf. Agribalyse project in France and PEF and Envifood Protocol in the EU. In France, LCI for poultry products at farm level exist for several impacts categories: GHG emissions, ecotoxicity, eutrophication, water consumption. Cf. Agribalyse project: www.ademe.fr/agribalyse-en. This work was carried on by the public operator ADEME with INRA, the main French public agricultural research institute, ART (Swiss research institutes) and all the French technical institutes representing each product (including ITAVI for poultry production). Thus, the work is based on strong agricultural and LCA expertise and provides consensus LCI data and modeling method for French agriculture LCI. Methods used for ecotoxicity and eutrophication are in line with the European Commission PEF: science-based methods, consensual at European level at least, are available to quantify those impacts. Both these impacts categories are considered highly relevant for poultry by the TAG of the guidance. The ambition of World Food Data project (project from ADEME) has the ambition to develop LCI related to non-French products. This work can help to include additional impacts in the guidance. It can be done quickly for impact categories where an impact categorization model is available and consensual at the European level: ecotoxicity, eutrophication, eventually water scarcity (water consumption including stress factors). This is planned for the future, however, was not possible to include in the current scope.

37 Original Revised 2 15 1 IPC The benefits of this approach include Use of recognized, robust and transparent methodology developed to take account of the nature of poultry supply chains. The benefits of this approach aim to include Use of recognized, robust and transparent methodology developed to take account of the nature of poultry supply chains. adopt proposed change

38 Original Revised 3 16-26 3 Un. Guelph This section is a little misleading since it deals only with the feed guidelines and not with poultry. I suggest removing it. Perhaps adding a caveat regarding the need to cross cut with the other documents would be sufficient. Recommend not removing it.

39 Original Revised 3 11 2.1 IPC It is intended that in future these guidelines will be updated to include multiple categories. It is intended that in future these guidelines will be updated to include multiple categories, provided sufficient reliability and data are provided to justify the changes. adopt proposed change

40 Original Revised 3 11 Chapter 2 (Scope) Paragraph h-3 French Ministry of Ecology, Sustainable Development and Energy The French Ministry of Ecology, Sustainable development and Energy also considers that biodiversity loss is a relevant impact for poultry. It welcomes very well the LEAP initiative to work on the assessment of biodiversity loss. It can share the study that has been led in 2013 on the development of an indicator on biodiversity loss based on landscape features: cf. http://www.developpement-durable.gouv.fr/Analyse-d-un-indicateur.html (in French language) Thank you
Stakeholders

Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)

Response

**PEF methodology should be referenced.** One location it can be added is in the summary literature review on existing standards as provided in an annex to the main document.

The rationale for not including some impact categories was based on the importance of that category in LCA, but rather on the pragmatic requirement of completing the guidance within the timeframe available. It has been stated that future revisions will be extended to include additional impact categories.

The rationale for not including some impact categories was not based on the importance of that category in LCA, but rather on the pragmatic requirement of completing the guidance within the timeframe available. It has been stated that future revisions will be extended to include additional impact categories.
• Some impact categories seem to be missing and of relevance, such as particulate matter. A cross-check with commonly considered/recommended indicators such as in the ILCD/PEF is recommended.

- The statement on "Agreement in the LCA community on the validity of the impact categorization model" (scientific consensus) page 2, line 5, does not seem justified. Please delete. - Current LCA practice generally foresees a more holistic approach. Based on international practice and dialogue, the International Reference Life Cycle Data System (ILCD) facilitated by the European Commission provides recommendations for most of the impact categories considered in current LCA practice. These are also adopted in e.g. the EC's PEF/DEF recommendations. These recommendations are operational and, as far as possible, reflect global average factors for generic assessments. We recommend cross-reference to such regional/international developments to help justify the selection of methods adopted.

- We recognize that several indicators require updating, where LEAP could refer to more recent developments, that indicators reflect different social/health/environment considerations, that they vary in terms of scope (pressures, risks, socio-economic, ...), and that indicators considered in e.g. an agricultural context may not be readily available in LCA frameworks. A clearer distinction justication of what would be mandatory vs what is recommendable would be beneficial with associated supporting justications. The argument to separately report indirect/direct land-use change emissions based on the time when emissions occur is not in line with LCA practice. All emissions in an LCA inventory can occur at different times/locations. A distinction in terms of short-term vs long-term emissions may be justified, but must then be conducted in a coherent manner. We recommend to delete this reason, while maintaining a position of caution in relation to consensus and separate reporting.

The rationale for not including some impact categories was not based on the importance of that category in LCA, but rather on the pragmatic requirement of completing the guidance within the timeframe available. It has been stated that future revisions will be extended to include additional impact categories. Remove the distinction of short-term and long-term emissions from the document.
Stakeholders

Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)

Response

46

Original

3

 Revised

33

2.2

Ge

EC, JRC, IES, Sustainabil

ity Assessment I & Monitoring Agricultural Resources Units

ISO 14025

Please give more details, e.g. ISO 14025:2006, Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures (or refer to the later section)

Accept proposed change. Replace “ISO 14025” with the following: ISO 14025:2006, Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures

47

Original

4

 Revised

4

4-10

2

2.2

Ge

IPIF, FEFANA

When using full life cycle assessment, the impact categories and the functional units along the feed to food value chain should be suitable and transparent.

Update and harmonise the goal and scope definitions of the different documents.

Accept recommendation-Secretariat to harmonize.

48

Original

4

 Revised

4 to

8

Chapter 2 (Scope)

Paragrap

h 2

Ge

French Ministry of Ecology, Sustainabil

ity development and Energy

The French Ministry of Ecology, sustainable development and energy agrees that more environmental impact categories are needed to understand the wider environmental implications and to claim overall environmental superiority of some small ruminant production systems and products. Include other impact categories in the guidance would be a strong opportunity to have wider uses of the guidance.

Include additional impacts in the guidance using French and European experiences. It can be done quickly for impact categories where an impact categorization model is available and consensual at the European level: ecotoxicity, eutrophication, eventually water scarcity (water consumption including stress factors).

The rationale for not including some impact categories was not based on the importance of that category in LCA, but rather on the pragmatic requirement of completing the guidance within the timeframe available. It has been stated that future revisions will be extended to include additional impact categories.

49

Original

4

 Revised

1

2.2

Ge

EC, JRC, IES, Sustainabil

ity Assessment I & Monitoring Agricultural Resources Units

These guidelines

Not clear: you refer to the LEAP or to the ISO 14025?

should refer to LEAP; Change to “The LEAP guidelines…”

50

Original

4

 Revised

1-3

2.2

TE

WEIDEMA

The choice of an attributional approach is in conflict with the target audience and application areas provided on page 1, line 8, the statement that LCA can be used as a decision support tool (page 6, line 14; page 6, line 20, and page 10, line 11), as well as with the many references later in the document to ISO 14040/44 (which does not support an attributional approach). It is important to be aware that LCA is not the same as Environmental Performance Assessment (which is regulated in ISO 14031); see the

Change to: “These guidelines are generally based on the consequential approach to life cycle modelling. The approach refers to process-based modeling, intended to provide a static representation of the consequences of the production and/or consumption of an additional amount of product.”

The Steering Committee has required that the guidelines be strictly attributional. This sets limitations to the use of the results for defining and estimating the impact of improvement options. There should be a disclaimer about this somewhere, if not, we have to strengthen the disclaimer.
Response: We respectfully disagree that the ISO 14044 does not support attributional approaches to LCA.

51 Original: Revised 5 3-8 3 3.1 Lue IFIP- FEFANA
To support the conjunction between the Animal Feed Guidelines and the present document, the SFIS study should be included as reference to make the between the different documents.

Response: study is not available on the website; citation not possible at present.

52 Original: Revised 6 3 1e Un. Guelph
Rephrase
I suggest “… (LCA) is one of the most complete and widely used methods … etc.”

Response: adopt proposed change

53 Original: Revised 6 9 4.2 1e WEIDEMA
It may be typical to limit the assessment to natural resources, but the purpose of these guidelines should not be to perpetuate such a limited understanding.

Response: adopt proposed change

54 Original: Revised 7 5 1e Un. Guelph
Rephrase
I would remove “somewhere”.

Response: adopt proposed change

55 Original: Revised 7 12 1e Un. Guelph
Definitions and explanations
“Characterization model”. This is not clear, did you mean “assessment model”?

Response: Change to: Based on a radiative forcing model, characterization factors, known as global warming potentials, specific to each greenhouse gas, can be used to aggregate all of the emissions to the same mid-point …
56 Original \hspace{1cm} Revised 4.3 ge E&JRC, IES, Sustainable Assessment I & Monitoring Agricultural Resources Units There is no reference to PEF Guide. It should be included. This can be included in the Annex making a comparison of existing standards; attached as a separate document.

57 Original \hspace{1cm} Revised 14067:2013 and are intended to guide the accounting and reporting environment impacts categories. only covers one category; rephrase Change P9:23-25: The principles are adapted from the WBCSD-WRI's Greenhouse Gas Protocol Product Life Cycle Accounting and Reporting Standard, the BSI PAS 2050:2008, the ILCD Handbook and ISO/TS 14067:2013 and are intended to guide the accounting and reporting of GHG emissions and fossil energy use.

58 Original \hspace{1cm} Revised The French document BPX-30-323 and its declinations in the food sector (food products in general, dairy products, coffee), established by the multi-stakeholders platform ADEME-AFNOR, is also a normative document that may ease assessing environmental footprint of poultry products. It is in line with ISO standards. Add French document BPX-30-323 and its declinations in the food sector, to the normative documents listed. See them in attached file. A comparison has been added in literature review/comparison of standards (Included as an additional section in the Annex containing the literature review)

59 Original \hspace{1cm} Revised Chapter 5 seems to be a new beginning and is a little surprising. Therefore, this chapter could be presented much earlier in the document. Suggestions: p10, L20 to p11, L21 to be moved at the very beginning Chapter 1; Paragraph 5.3 to be moved at the end of Chapter 1; Paragraph 5.1 to be moved at the very beginning of Chapter 2 (before 2.1); Paragraph 5.2. to be moved at the end of 2.1. The whole chapter could be moved, but it should not be divided in two different sections and spread out through the document. Recommend not changing existing document.

60 Original \hspace{1cm} Revised Accuracy - The term ‘reasonable confidence’ and ‘sufficient’ accuracy need to be better defined. Suggest to add that an uncertainty assessment should be included in the assessment. It is proposed to relate here to the procedure of the IPCC guidelines for GHG inventories, i.e. a tiered approach according to the importance of the emission source (following a key source analysis). The intent of this passage is to ensure that practitioners assess the robustness of their conclusions, and not to require a full uncertainty assessment for all studies. The character of the evaluation can be different depending on the study goal and scope.
61 Original Revised 10 13ff 1 EIC, JRC, IES, Sustainable Assessment & Monitoring Agricultural Resources Units

Transparency - The term 'sufficient information' needs to be defined. It seems to be incompatible with the requirement that 'all data…' can be verified? If so, then this gives room for subjective interpretation which should be avoided.

Stakeholders Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)

Response

62 Original Revised 10 15 4.4 Not feasible for industry

IPC 'To allow third parties to verify all data, calculations and assumptions, and intended users to make associated decisions with confidence'

Stakeholders Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)

Response

Adopt proposed change

63 Original Revised 10 25 5 Unlisted Livestock

Use poultry assumptions

IPC The demand for livestock products is projected to grow 1.3 percent per annum until 2050…

Stakeholders Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)

Response

Adopt proposed change

64 Original Revised 10 5 Growth livestock Use poultry assumptions

IPC A description of the system were chickens are housed on the floor or in voliere systems or alike is missing. Since Europe per 2013 is not allowing cages anymore these systems are common in Europe. This description should therefore be included. It is also not covered in the other descriptions as there, there is often a with either outdoor or cage

Stakeholders Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)

Response

Add to glossary: Volières systems: These systems offer the hens a relatively complex environment where they can move very freely. The layers can move to several open stories in the system where they can find food, water, nests and perches, and of course there is a large open space on the floor for scratching.
<table>
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<tr>
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<th>Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)</th>
<th>Response</th>
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<tr>
<td>65</td>
<td>Original</td>
<td>Revised 11</td>
<td>28-30</td>
<td>5.1</td>
<td>Ge</td>
<td>IRIF- FEFANA For the common basis there is also a clear need to harmonise the goal and scope definition and the selection of impact categories (which has already been indicated several times).</td>
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<td>66</td>
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<td>67</td>
<td>Original</td>
<td>Revised 12</td>
<td>18-19</td>
<td>5.2</td>
<td>Ge</td>
<td>IRIF- FEFANA Why the improvement of the guidelines is proposed to be a future work?</td>
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<tr>
<td>68</td>
<td>Original</td>
<td>Revised 12</td>
<td>29 to 35</td>
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<td>French Ministry of Ecology, Sustainable Development and Energy</td>
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<td>69</td>
<td>Original</td>
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<td>IPC</td>
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<td>70</td>
<td>Original</td>
<td>Revised 13</td>
<td>Line 20-21</td>
<td>Hatching poultry</td>
<td>IPC</td>
<td>Better say: ‘Breeding poultry’</td>
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<td>71</td>
<td>Original</td>
<td>Revised 14</td>
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72 | Original | Revised | Page no. | Line no. | Chapter no./annex/spreadsheets name (e.g. table 3) | Paragraph figure/hyperlink (e.g. table 1) | Type of comment | Stakeholders | Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents) | Response |
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
72 | Original | Revised | 14 | 10 | 6.1 | t | IEC | The example cited, use of organic feed, does not really reflect the point made in the sentence dealing with detailed management and housing prescriptions. “Some systems offer detailed management and housing prescriptions (for example organic system of production).” | adopt proposed change |
73 | Original | Revised | 15 | N/A | Fig 4 | g | IEC | I could not find reference of Figure 4 in the text of these guidelines. Insert a reference to Figure 4 in the text. | Add the following at page 13 line 26: Figure 4 shows the growth in the modern poultry sector, both in terms of meat production as well as egg production. Also rename the current figure 3 to become figure 4. |
74 | Original | Revised | 15 | 7-8 | t | IEC | Feed (meaning for the poultry sector, finished feeds) is typically produced fairly close to the farms – risk of sedimentation of ingredients if shipped over long distances. Feed ingredients may come from distant places (soy from Brazil shipped to Africa,…) by boat but finished poultry feed is rarely transported by boat. | Will be happy to rewrite the sentence if my comment is considered. | |
75 | Original | Revised | 15 | 6.2 | IPC | Poultry production systems can be classified on the basis of scale and animal genetics. Poultry production systems can be classified on the basis of scale, type of housing, feeding systems, animal genetics, and health provisions and in some cases certification program (systems prescriptions). Feed represents a major component of poultry supply chains. The possibility of producing feed far from poultry production sites and of shipping it by energy efficient sea transport has enabled many poor agricultural regions to develop poultry sector. These first arose in Europe and the United States and are now allowing development of agricultural regions in the developing economies. | Change to: Poultry production systems can be classified on the basis of scale, type of housing, feeding systems, animal genetics, and health provisions and in some cases certification program (systems prescriptions). Feed represents a major component of poultry supply chains. The possibility of producing feed far from poultry production sites and of shipping it by energy efficient sea transport has enabled many poor agricultural regions to develop poultry sector. These first arose in Europe and the United States and are now allowing development of agricultural regions in the developing economies. |
76 | Original | Revised | 15 | 6.2 | IPC | Has enabled many poor agricultural regions to develop poultry sector. These first arose in Europe and the United States and are now making headway in the developing economies. Has enabled many poor agricultural regions to develop poultry production sector. These first arose in Europe in the United States and are now allowing development of agricultural regions in the developing economies. | Change to: Poultry production systems can be classified on the basis of scale, type of housing, feeding systems, animal genetics, and health provisions and in some cases certification program (systems prescriptions). Feed represents a major component of poultry supply chains. The possibility of producing feed far from poultry production sites and of shipping it by energy efficient sea transport has enabled many poor agricultural regions to develop poultry sector. These first arose in Europe and the United States and are now allowing development of agricultural regions in the developing economies. |
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<td>77</td>
<td>Original</td>
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<td>Fig 4</td>
<td>Ge</td>
<td>ECB, JRC, IES, Sustainable Assessment I &amp; Monitoring Agricultural Resources Units</td>
<td>Coloring</td>
<td>The coloring looks like emphasis should be put on Asia (only region with pattern, all others colors)</td>
</tr>
<tr>
<td>78</td>
<td>Original</td>
<td>Revised</td>
<td>17</td>
<td>6.2.3</td>
<td>IPC</td>
<td>Commercial / large scale production (Also intermediate production is commercial. It is all above semi-smallholder, so larger is a better description. Including many family farms)</td>
<td>Larger scale production</td>
<td>Adopt the proposed change</td>
</tr>
<tr>
<td>79</td>
<td>Original</td>
<td>Revised</td>
<td>17</td>
<td>6.2.3</td>
<td>IPC</td>
<td>Large-scale production (It is all above semi-smallholder, so larger is a better description. Including many family farms)</td>
<td>Larger scale production</td>
<td>Adopt the proposed change</td>
</tr>
<tr>
<td>80</td>
<td>Original</td>
<td>Revised</td>
<td>17</td>
<td>6.2.3</td>
<td>IPC</td>
<td>Intensive systems may involve contract farming, with…</td>
<td>Intensive systems may involve contract farming, providing more income security and consistency of the chickens provided for the farmer, with…</td>
<td>Decline. The recommendation does not seem relevant for descriptions of the systems.</td>
</tr>
<tr>
<td>81</td>
<td>Original</td>
<td>Revised</td>
<td>17</td>
<td>6.2.3</td>
<td>IPC</td>
<td>Add between the last two lines</td>
<td>Poultry production is often family based. The number of poultry held is mostly related to the possibility to provide a family, or a few families, with an income. Also larger units exist with e.g. non-family members working on the farm.</td>
<td>Should this be tied to small holder system description? p.15 line 217 Recommend add first 2 sentences just before reference to Figure 5</td>
</tr>
<tr>
<td>82</td>
<td>Original</td>
<td>Revised</td>
<td>17</td>
<td>6.2.3</td>
<td>Ge</td>
<td>ECB, JRC, IES, Sustainable Assessment I &amp; Monitoring Agricultural Resources Units</td>
<td>Text unrelated</td>
<td>Suggest to remove paragraph which seems at this point a bit out of context</td>
</tr>
</tbody>
</table>
83 Original Revised 17 16-20 6.2.3 Ge EC, JRC, IES, Sustainabl e Assessmen t 1 & Monitoring Agricultural Resources Units Text unrelated

If this is intended as an introduction for the following sub-section, suggest to move it to section 6.2 (before start of sub-section 6.2.1).


84 Original Revised 18 8 6.2.4 Ge EC, JRC, IES, Sustainabl e Assessmen t 1 & Monitoring Agricultural Resources Units "lay-old-chick mortality rates"

Sounds like needs further explanation; sentence could also be simplified "hens surviving disease or predators may live for..."

We think the intention of the original wording (from IEC/IPC) was to indicate that these systems have high mortality of chicks. Change to: "In backyard or diversified systems which often have high mortality rates for day-old chicks from disease and predation, surviving hens may live for five or more years."

Response: Adopt recommendation.

85 Original Revised 18 14-15 6.2.4 Ie IBC I doubt small holders would keep feeding laying hens for several months and wait for the next production cycle. These birds would likely be consumed for meat and new chicks would be raised for the next season

This is possible. The intent of the language is to ensure that if there are non-productive months that they be included in the analysis.

Recommend no change.

Response: Adopt recommendation.

86 Original Revised 19 N/A 6.2.4 ge IEC Suggest to include at the end of this section the information about post-farm processes related to eggs. Currently included in section 6.2.5 dealing with meat-producing birds

"Examples of post-farm processes include: egg packing and grading plants where shell eggs may be washed, categorized by weight and packed;... Egg processing plants that produce a wide range of egg products, liquid and dry powders"

Adopt recommendation.

Response: Adopt recommendation.

87 Original Revised 20 28-29 6.2.5 ge IEC Proposed to delete these 2 lines if the changes proposed for page 19 are taken into consideration

Adopt recommendation.

Response: Adopt recommendation.

88 Original Revised 20 12 6.2.5. IPC .Raised in large, open barns

.Raised in large open or large, fully-enclosed barns.

Adopt recommendation.
6.2.5. Last part of sentence is not technically correct. Necessary to say:

The total annual Global Warming Potential between layer systems increase from cage to free range to organic to barn (e.g. 2.92, 3.38, 3.42 and 3.45 kg CO2 per kg eggs, Leinonen et al. 2014) and between broiler systems they increase from standard to free range to organic (e.g. 4.41, 5.13 and 5.86 kg CO2 per kg edible carcass weight, Leinonen et al. 2012b). Leinonen, I., Williams A.G., Wiseman J., Guy J., Kyriazakis I. 2012a. Predicting the environmental impacts of chicken systems in the United Kingdom through a life cycle assessment: egg production systems. Poultry Science 91(1):26-40. Leinonen, I., Williams A.G., Wiseman J., Guy J., Kyriazakis I. 2012b. Predicting the environmental impacts of chicken systems in the United Kingdom through a life cycle assessment: Broiler production systems. Poultry Science. 91:8–25.

These are single studies. If we include this level of detail in the guidelines, then we should include the average of all existing studies, which may not be representative of global production. Both are cited in the literature review in the appendix.

6.3. Wording of sentence “Farmers keeping poultry may do so….”

Change to: Farmers keep poultry with many objectives in mind.

6.4. Sentence should be reworded to make it clear that while overall emissions are numerically higher for layers and broilers compared to backyard, they are lower when related to kg proteins or kg products produced (egg or CW).

At page 21 line 29. Recommend deleting sentence beginning with “overall” and ending with “protein content.” This deletion avoids a comparison across systems which is not necessary for the document’s purpose.

8.1. Due to the limited impact categories and the system boundaries set the alignment cannot be clearly seen.

Decline: Comment does not seem relevant to the text in the document at this location.

8.2. It would be better to make a proper definition instead of pointing out to be careful by using the results.

Decline: unclear what expansion of boundaries is suggested - inclusion of consumers? No specific recommendation for improving FU definition.
Proposed allocation between different cuts of meat. Generally, the proposed allocation is chosen by the LCA practitioner, the different economic value of the different allocation differences between the cuts can be assumed. However, if economic allocation is chosen for physical allocation it is possible that one cut contains a higher share of remaining bones, which would need to be considered in the allocation method. It may be useful to provide a more detailed description of how to define the functional unit.

Our intention is to restrict options to achieve greater harmonization within the sector. Regarding the issue of the functional unit: we assume that it is the provision of edible products for human consumption and other in edible parts, which would need to be considered in the processing facility. Thus adherence to these guidelines precludes differentiation between different products entering the human edible market. It is also mentioned in the discussion regarding functional unit that the overall edible portion be combined and considered as a single product from the feeding facility. Thus adherence to these guidelines precludes a differentiation between different products entering the human edible market. It is also mentioned in the discussion regarding functional unit that the overall edible portion be combined and considered as a single product from the feeding facility. Thus adherence to these guidelines precludes a differentiation between different products entering the human edible market. It is also mentioned in the discussion regarding functional unit that the overall edible portion be combined and considered as a single product from the feeding facility.

Table 1

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tan, H.C.</td>
<td>Preparatory text is to be more detailed text on the procedure for defining the functional unit, e.g. based on B P Weidema, H Wenzel, C Petersen, K Hansen (2004): The product, functional unit and reference flows in LCA. København: Mijakstenlysen. (Environmental News 70), with sufficient real life examples of poultry products.</td>
</tr>
</tbody>
</table>

Table 1: Could you add a note to better explain what you mean by “qualifying characteristics”? What is it for? Does it mean that it is the basis of calculations and so, for example, that live weight will be calculated based on the carcass yield? Is it additional information to provide along with the live weight? Etc.
I agree and it is what we have done in our calculations (Vergé et al. 2012). However, when large scales are used (i.e. provinces, states, countries) the live weight (LW) is either not known or not precisely. Therefore, the carcass weights (CW) recorded in slaughterhouses are the best estimates one can find (this is also mentioned p26 Ln26-28 in these guidelines). The LW is then back calculated using the carcass yield (CWY). This back calculation can add huge uncertainties and therefore, in this case, the LW is not necessarily the best unit. For example, in the case of cattle, the CWY is about 60% for beef steers and 50% for cow culled and if it is not possible to differentiate the steers from the cow because the slaughterhouse gives only the total amount of meat, again, a big uncertainty is added. In the case of poultry the same thing could happen between breakers and culled layers. I am mentioning this point because weight values are extremely important since they are used at the very end of the carbon footprint calculations. So they have a direct and strong impact on the results.

If the payment to the farmer is based on carcass weight, this may still be the appropriate functional unit at the farm gate. The functional unit does not imply that the corresponding allocation is (yet) needed (rather total emissions and total live-weight). As farm-gate assessments do not include the burdens of the post-farm gate processor it is not appropriate to refer to carcass weight at the farm-gate. Replace last sentence with: “For informational purposes, the dressout fractions should be specified (that is live to carcass weight and carcass weight to edible weight). However, without knowledge of post-farm processing burdens and coproduct allocation, it is not appropriate to report farm-gate burdens on a carcass or edible weight basis."

As farm-gate assessments do not include the burdens of the post-farm gate processor it is not appropriate to refer to carcass weight at the farm-gate. Replace last sentence with: “For informational purposes, the dressout fractions should be specified (that is live to carcass weight and carcass weight to edible weight). However, without knowledge of post-farm processing burdens and coproduct allocation, it is not appropriate to report farm-gate burdens on a carcass or edible weight basis.”

Accept proposed language, but not the last sentence. In our opinion, without proper allocation to coproducts at the post-farm gate processor it is not appropriate to refer to carcass weight at the farm-gate. Replace last sentence with: “For informational purposes, the dressout fractions should be specified (that is live to carcass weight and carcass weight to edible weight). However, without knowledge of post-farm processing burdens and coproduct allocation, it is not appropriate to report farm-gate burdens on a carcass or edible weight basis.”

As farm-gate assessments do not include the burdens of the post-farm gate processor, results of such analyses should only be disseminated together with a discussion of possible allocations of total emissions to co-products. Results should consist of information relative to both live weight and carcass weight. Accept proposed language, but not the last sentence. In our opinion, without proper allocation to coproducts at the post-farm gate processor it is not appropriate to refer to carcass weight at the farm-gate. Replace last sentence with: “For informational purposes, the dressout fractions should be specified (that is live to carcass weight and carcass weight to edible weight). However, without knowledge of post-farm processing burdens and coproduct allocation, it is not appropriate to report farm-gate burdens on a carcass or edible weight basis.”

As farm-gate assessments do not include the burdens of the post-farm gate processor, results of such analyses should only be disseminated together with a discussion of possible allocations of total emissions to co-products. Results should consist of information relative to both live weight and carcass weight. Accept proposed language, but not the last sentence. In our opinion, without proper allocation to coproducts at the post-farm gate processor it is not appropriate to refer to carcass weight at the farm-gate. Replace last sentence with: “For informational purposes, the dressout fractions should be specified (that is live to carcass weight and carcass weight to edible weight). However, without knowledge of post-farm processing burdens and coproduct allocation, it is not appropriate to report farm-gate burdens on a carcass or edible weight basis.”
It is more challenging to define a functional unit based on edible products for the farm gate for reasons elaborated below. Thus for purposes of these guidelines, the functional unit for farm gate assessments shall be on the basis of live weight. In some situations an analyst may wish to use a functional unit of edible weight at the farm gate, and thus a reference flow of live weight coupled with an appropriate allocation to the nonedible portion (which would be based on post farm gate processing information) could be adopted.

The section lacks a paragraph or two to describe the difference between the functional unit and the reference flow. Add a section on how to determine the reference flow, with adequate examples, showing the relation to the functional unit.

Section 8.3 has been modified to include this discussion. Also replace p26 L34 (first part of paragraph) with: For purposes of this guideline document, the preferred functional unit is a specified quantity of human edible product ready for shipping (or sale) at the processing facility dock (or farm gate for backyard systems). An example of a functional unit for meat products would be 1000 kg of edible meat – with specified edible yield, moisture, fat and protein packaged for delivery to retail or food services; the reference flow for this situation would be the total product weight including the nonedible portion.

It is not clear why this (and following) sections are subsection to 8.4? The subsections are intended to further clarify the system boundary discussion.
8.4.1 Te. ENEA

It is not clear why the system boundaries begin with the great grandparent generation. This point should be better explained, especially for practitioners who do not have a previous knowledge of poultry systems. It was the judgement of the TAG that this was the appropriate boundary. The breeding supply chain has been shown to cumulatively approach 7-8% of the life cycle impacts, and thus should be included. Add the following p28 L13: The TAG agreed that the breeding system should extend to the great grandparent generation based on previous studies which show the breeding system contributes between seven and 8% of life cycle impacts (Wiedemann et al., 2012; Leinonen et al., 2012b).

CONSISTENCY WITH OTHER GUIDELINES?

TIltapia are mentioned only as an example. Experts indicated that ducks and tilapia may be raised together, and as an example of the limitations of the guidelines, this was included to indicate that, at minimum, additional considerations for allocation of resources should be considered in such a multifunctional system.

Definitions and explanations

Could you provide the rationale for choosing the great-grandparent generation? This point leads to the important question of the time unit. According to 8.4.4 12months is used and it seems fair. However, since the great grandparents are the starting point, the guidelines should certainly give more details on how to extend the results to the full year (note that one broiler generation can be close to 1.5 months) refer to row 15. Add following: To assess the time unit of 12 months of operation, data should be collected for the operation over a year’s time. As there will be a non-integer number of bird generations in this time frame, the rolling flock average and annual live weight production can be used to calculate the total inputs and emissions.

IS THIS REPRESENTATIVE?

Figure 10

Confusing presentation. The big box; instead of “fuel”, did you mean “fuels/energy”? Also, the Note mentions “grey shading” but the “Input to laying system” is also a grey box. Nomenclature change “fuel” to “fuels/energy”. Color Scheme was changed on printing recommend correcting colors. In addition arrows from the inputs box should begin at the outside edge of the box the indication is that all of the inputs are needed for both breeding and egg production.
Check the sentence and rephrase Replace paragraph beginning P29 L17: The LEAP Animal Feed Guidelines covers all emissions associated with land use and land-use change. The LEAP Poultry Guidelines cover all inputs and emissions in the poultry supply chain not covered by the LEAP Animal Feed Guidelines. This includes emissions associated with poultry production and management. The latter includes accounting for the utilization of excreta, where it is important to avoid double counting if excreta represents a direct input for feed production which is included in the LEAP Animal Feed Guidelines. The Poultry Guidelines include accounting for breeding stock as well as those animals used directly for meat and egg production. This may involve more than one farm if animals are traded between farms prior to going to processing.

Add an arrow from Egg washing to Waste water treatment

It is not clear what is imprecise: if there is separation of feed production phase and animal production phase, the boundary is at the point of consumption.

Refine methodology proposing a tiered-approach, to make a first order estimate on the basis of all impact and use criterion based on impact rather than on mass for exclusion. See comment above on accuracy Replace with the following text: In determining whether to expend resources and effort to include specific inputs, a 1 percent cut off threshold for the impact arising from an individual, specific unit process (activity) should be adopted; larger thresholds shall be explicitly documented and justified by the project goal and scope definition. A minimum of 95 percent of the impact for each category shall be accounted for. Inputs to the system that contribute less than 1 percent of the impact for a specific unit process (activity) in the system can be included with an estimate from a scoping analysis (Section 8.2). The scoping analysis can also provide an estimate of the total impact to evaluate against the 95% minimum. It should be noted that if data are readily available, the cut-off rules are not intended to justify exclusion of these inputs.

Replace with the following text: 1% threshold for mass and energy. With regard to energy this seems ok. With regard to mass, there are the conditions that the ‘omitted’ mass is not one of high impact intensity and that 95% of total impact must be covered. That means that de facto the practitioner must make a first-order estimate of the contribution of impact (rather than just mass) which makes the mass-criterion obsolete. Refine methodology proposing a tiered-approach, to make a first order estimate on the basis of all impact and use criterion based on impact rather than on mass for exclusion. See comment above on accuracy
8.4.3 TE WEIDEMA
The text here deals with allocation ("impacts are divided evenly by mass over all such products"), which really belongs to another chapter. It is incorrect not to distinguish between different edible parts, when these are sold on different markets and at different prices, since their degree of substitutability varies, as expressed by the functional unit. That there are no significant biophysical and nutritional differences between the products does not mean that there cannot be other significant differences that make them different in a comparison or substitution context.

115

8.4.3 TE WEIDEMA
If something is included with an estimate, it is not excluded. When everything is included with estimates from the scoping analysis, it is inconsistent and confusing to require only 95% to be accounted for.

8.4.3 TE WEIDEMA
Change the last part of the paragraph after the word "system" in line 20 to: "can be included with an estimate from a scoping analysis (Section 8.2). An exception to this is in cases where significant environmental impact is associated with a small mass input (e.g. some material may be present in small quantities, yet still have a relatively large environmental impact)."

115

Accept proposed change

116

Accept proposed change. Diagram is with secretariat; modification not yet included.

117

Accept proposed change.
The impact of feed from the farm level is missing in that material flow diagram.

The limitation of the impact categories to the GWP is the wrong approach. It does not reflect the real potential of the feed to food chain and is not in an alignment of the other guidelines.

It appears an unnecessary complication to have different recommendations/requirements for applications that involve alternate systems. Often a study that was first intended as stand-alone is later used in a comparison. Consider simplifying by making it a general requirement to include capital goods, i.e. deleting the section except the last 6 words.

What is the reason to exclude capital goods with lifetime > 1 year? Even if the specific study does not aim at assessing alternate systems, the results might be used for such purposes. There is no good reason to ignore part of the burden ...

Diagram to be improved. Arrow should be from the edge of the "inputs" box, not from the internal "ration" box. The intention was that everything in the "inputs" box goes to both breeding and broiler production.

This is planned for the future, however, was not possible to include in the current scope.

Decision to exclude infrastructure was made. Text updated.

Decision to exclude infrastructure was made. Text updated.

Decision to exclude infrastructure was made. Text updated.
<table>
<thead>
<tr>
<th>Original</th>
<th>Revise d</th>
<th>Page no.</th>
<th>Line no.</th>
<th>Chapter no.</th>
<th>Paragra ph/figure/no t (e.g. table)</th>
<th>Type of comment</th>
<th>Stakeholders</th>
<th>Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>123</td>
<td>Original</td>
<td>32</td>
<td>8ff</td>
<td>8.4.6</td>
<td>r EC, JRC, IES, Sustainabili e Assessmen t I &amp; Monitoring Agricultural Resources Units</td>
<td>Ancillary services. This is an interesting aspect but appears to be VERY difficult to find fair boundaries and allocation procedures. This aspect likely warrants an extra report. Suggest to exclude from analysis at the current stage but mention that this might be important and guidance will be developed ...</td>
<td>Stakeholders</td>
<td>Include these activities are not mandatory, but mentioned to alert the practitioner to their potential importance.</td>
<td></td>
</tr>
<tr>
<td>124</td>
<td>Original</td>
<td>33</td>
<td>10</td>
<td>8.5</td>
<td>r EC, JRC, IES, Sustainabili e Assessmen t I &amp; Monitoring Agricultural Resources Units</td>
<td>If in the future these guidelines are intended to be updated to include multiple categories, they should be aligned to existing methodologies (e.g. PEF Guide), in order to avoid multiplication of assessments</td>
<td>Stakeholders</td>
<td>Make reference to existing methodologies. Accept recommendation-Secretariat to harmonize.</td>
<td></td>
</tr>
<tr>
<td>125</td>
<td>Original</td>
<td>33</td>
<td>10</td>
<td>8.5</td>
<td>r EC, JRC, IES, Sustainabili e Assessmen t I &amp; Monitoring Agricultural Resources Units</td>
<td>Inclusion of these activities are not mandatory, but mentioned to alert the practitioner to their potential importance.</td>
<td>Stakeholders</td>
<td>Delete Reference to ISO deleted.</td>
<td></td>
</tr>
<tr>
<td>126</td>
<td>Original</td>
<td>34</td>
<td>9-14</td>
<td>9.1</td>
<td>r ISO14044:2006 does not have a section 9. And in the section on allocation (Clause 4.3.4) there is no mentioning of &quot;bio-physical causality&quot; or &quot;physical properties such as mass, or protein or energy content&quot; as 'other relationships'. On the contrary, the original standard text (ISO 14041) contains this clarification: &quot;The resulting allocation will not necessarily be in proportion to any simple measurement such as the mass or molar flows of coproducts&quot;. The only specific causal relationship mentioned is economic value, as already quoted in the extensive ISO step 1-3 quote on page 33-34.</td>
<td>Stakeholders</td>
<td>Delete Reference to ISO deleted.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>127</td>
<td>Original</td>
<td>34</td>
<td>16</td>
<td>9.1</td>
<td>r ISO14044:2006 does not have a section 9. And in the section on allocation (Clause 4.3.4) there is no mentioning of &quot;bio-physical causality&quot; or &quot;physical properties such as mass, or protein or energy content&quot; as 'other relationships'. On the contrary, the original standard text (ISO 14041) contains this clarification: &quot;The resulting allocation will not necessarily be in proportion to any simple measurement such as the mass or molar flows of coproducts&quot;. The only specific causal relationship mentioned is economic value, as already quoted in the extensive ISO step 1-3 quote on page 33-34.</td>
<td>Stakeholders</td>
<td>Delete accept proposed change</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(in which case the base-load marginal is applicable). - ( . . . ) whether ( . . . ) the inputs are delivered through an open market, in which case it is also necessary to know: - whether any of the processes or technologies supplying the market are constrained (in which case they are not applicable, since their output will not change in spite of changes in demand), - which of the unconstrained suppliers/technologies has the highest or lowest production costs and consequently is the marginal supplier/technology when the demand for the supplementary product is generally decreasing or increasing, respectively. Besides that, when the by-product is part of the average, the resulting system cannot be solved mathematically.

128

To be more precise, change "co-product" to "by-product" here, since system expansion can be applied to non-determining co-products (by-products) only.

129

"Sharing the credit" of an avoided burden is not a meaningful concept, since the avoided burden is exactly the share of burden that is assigned exclusively to the determining product. The difference in procedure when dealing with a determining product flow and a non-determining product flow could use some additional treatment here.

130

To avoid confusion, the term "step" in this context should only be used about the ISO procedure.

131

Deletion. "his involves a three-step approach and f"

132

To avoid confusion, the term "step" in this context should only be used about the ISO procedure. The subdivision in 3 groups is an unnecessary complication.

The bullet list in the original has been deleted, so comment no longer relevant in this context.

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The bullet list in the original has been deleted, so comment no longer relevant in this context.
It is not all processes and activities that should be divided, but only those that lead to the reduction in the number of co-products for which system expansion is needed. The difference between flow 1.b. and flow 1.c is unclear. The division at this point gives an unnecessarily complicated description and leads to a duplication of identical decision boxes in step 2 and 3 in the current Figure 12. By including here all forms of subdivision, also those currently described under Step 2 (page 35-36), the description becomes more clear and straightforward. Note that Step 2 describes combined production (variable output proportions), not joint production (fixed output proportions). Note that layer operations have not been included here since the outputs of layer operations are not individually variable when the operations are optimized for egg output.

Change to: “In the first step “ISO step 1a subdivision”, subdivision of the farm/processing facility into production units should be done when this implies that co-products can be assigned specifically to one production unit, for example:

- packaging or post-processing storage that can be assigned to one specific product only;
- inputs of feed, pesticides, operations, climate control, internal transport or drinking water for a specific bird type at a multi-species poultry farm.

When feed is provided to multiple animal species, the animal growth requirements may be used to apportion the shared feed between the species. Some general inputs, such as internal transport, capital goods and office overheads, which cannot be directly attributed to specific production units, but are nevertheless necessary for the operation of all production units, can normally be assigned to each production unit in proportion to the causal relationship that determines increased need for each input, such as weight, volume, or area (transport, roads, buildings) or revenue (office and accounting).”

The use of ‘joint’ and ‘combined’ has been corrected. The description has been modified to include the proposed change.

There is no section 9 in the ISO 14044. Please make the appropriate correction see line 126; reference to ISO deleted.

System expansion within these guidelines is interpreted as “substitution”. Since the ISO 14044 does not automatically make the statement “system expansion = substitution”, the text should be modified

Decline: although not explicit in ISO 14044, the common application of system expansion is through substitution, which is intended by these guidelines.
This consequential approach is not chosen and thus system expansion is not adopted.

Decline. This consequential approach is not chosen and thus system expansion is not adopted.

Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)

Response

The text here suggests that there are situations where avoided production cannot be unambiguously identified. However, since the input to a market is identified by the same degree of ambiguity as any other market input to the product system. If the procedure that is generally accepted for identifying upstream market inputs is disturbed just because the sign of the flow has been inverted, this places into question the entire procedure by which we our product systems, and can therefore not be used as an argument for not applying the procedure specifically for avoided production. Thus, system expansion should be accepted as adequate in all cases where the substitution by physical causality has not been possible. Since the procedure for identifying suppliers to a market is not widely known, due to its concealed placement in ISO 14049, it may be helpful to quote this ISO text, in parallel to the quote on p. 36 of the allocation section in ISO 14044.

The text here suggests that there are situations where avoided production cannot be unambiguously identified. However, since the input to a market is identified by the same degree of ambiguity as any other market input to the product system. If the procedure that is generally accepted for identifying upstream market inputs is disturbed just because the sign of the flow has been inverted, this places into question the entire procedure by which we our product systems, and can therefore not be used as an argument for not applying the procedure specifically for avoided production. Thus, system expansion should be accepted as adequate in all cases where the substitution by physical causality has not been possible. Since the procedure for identifying suppliers to a market is not widely known, due to its concealed placement in ISO 14049, it may be helpful to quote this ISO text, in parallel to the quote on p. 36 of the allocation section in ISO 14044.

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Change to: “System expansion (ISO step 1b) should be applied whenever possible. It is always possible to determine the avoided production with the same degree of unambiguity as any other market input to the product system, by using the same procedures for identifying the avoided production as those used for determining the other inputs to the product system, cf. ISO 14049 clause 6.4: “The supplementary processes to be added to the systems must be those that would actually be involved when switching between the analysed systems. To identify this, it is necessary to know: whether any of the processes or technologies supplying the market are constrained (in which case they are not applicable, since their output will not change in spite of changes in demand), which of the unconstrained suppliers/technologies has the highest or lowest production costs and consequently is the marginal supplier/technology when the demand for the supplementary product is generally decreasing or increasing, respectively.” In practice, the avoided production is included in the product system by changing the non-determining co-products to inputs with a negative sign, whereby they directly cause a reduction in the contribution from the suppliers determined by the above procedure.”

Change to: “The avoided production shall have the same functional unit as the by-product, of the processes or technologies determining co-products to inputs with a negative sign, whereby they directly cause a reduction in the contribution from the suppliers determined by the above procedure.”

This text is confusing and unnecessary.

Delete ", however, at the inventory level there is no corresponding reduction in the emissions or exchanges with the environment" accept proposed change
The erroneous use of system expansion of determining products is not isolated to backyard and diversified systems. The error should be described more clearly, so that the reader will understand why this should not be done.

Change to: “System expansion shall not be applied to the determining product of a farm/processing facility, but only to the non-determining by-products. For example, the environmental burden of cattle manure cannot be identified by expanding the manure system with an avoided cattle production system. Environmental burdens can only be assigned to determining products (hence the name) that cause these burdens, not to the non-determining by-products.”

Section modified to present an attributional approach so discussion of avoided burden associated with by-products was removed.

The allocation according to physical causalities is equivalent to the subdivision already described, and should be moved up before the system expansion. The relevant parts of the text have already been included in the proposed changed text for line 30 on p. 34 to line 23 on p. 35.

Delete, when proposed change is accepted for line 30 on p. 34 to line 23 on p. 35.

Decline. Not all of the language proposed above was incorporated.

Why shall system expansion not be used in the example? The section gives the impression that, first, system expansion is recommended as the best option for allocation if possible, but, finally, it appears that the practitioner is discouraged to use system expansions for various reasons mentioned. This seems to be inconsistent. If this guidelines propose (for good reasons) to deviate from previous guidelines then this should be done clearly and upfront!

Provide explanation/justification. Suggest to include more positive example where system expansion can/should be applied. So far, the only example is electricity. Reformulate sections to avoid confusion between general introduction and final recommendations. Also, on page 40: “… the recommendation… is to choose economic … allocation” does not seem consistent with the previous sections. Clarify.

Section modified to present an attributional approach so discussion of avoided burden associated with by-products was removed.

The last box in the right, where all flows are linked, refers to “use allocation keys”. However in the text there is no reference to such keys, so that the practitioner may be confused when such “keys” should be applied to flows that avoid allocation (such as flow 1a).

Clarify

Clarifying text added to the caption: Allocation keys used in the right-most box refer to the factors derived during application of the decision tree that are used to allocate inputs among multiple functions. For example, if economic allocation is used (e.g., to arrive at 3c), the allocation key for that stage is the ratio of the revenue of the co-product of interest to the total revenue for the activity.
Flow 2c, where economic allocation is applied at the production unit level, implies the loss of physical relationships between the inputs to the system and the shares allocated to each product unit. So, if at a later stage (step 3) system expansion with substitution (3a) is applied, results will be biased due to the mixing of two allocation procedures, where the first one (economic) to be applied causes the loss of physical consistency of the system, while the second one (substitution) requires a perfect physical correspondence to ensure consistency between the amount of product substituted at flow 3a with the inventory of that product that was economically allocated at flow 2c.

This section has been re-written from an attributional perspective. It is acknowledged that allocation keys may be different at different stages of the supply chain and this can lead to the mismatch described. A fully consequential approach is the only mechanism that can maintain all the balances raised in the comment.

The division into 3 steps is unnecessarily complicated and leads to a duplication of identical decision boxes in step 2 and 3 in Figure 7. Essentially, only two steps can be identified from the description: 1) A division of the farm/factory into separate production units; 2) A procedure for the co-products from each production unit. The description in Box 3 is unnecessarily complicated and includes unnecessary procedures. The Box to the right of box 3 is unclear as to what exactly is to be done.

In fact, the reviewer is correct. But there is nothing wrong in duplicating the decision boxes in step 2 and 3. We can add a sentence, indicating that this is a duplication, but that we do this to separate the different production units.

For clarity purpose I would move these two sentences back to line 24 to ‘introduce’ the definitions given L24 to 30.

I would move these two sentences back to line 24 to ‘introduce’ the definitions given L24 to 30.
146. **Original**: Revised 38 15 9 9.2 Te. ENEA

It is said that the existing standards do not allow a credit for sold electricity or natural gas. Nevertheless, both figure 12 as well as page 43, line 4, and page 41, line 16, allow the system expansion/substitution. This point should be clarified: is the substitution (and the use of credits) allowed or not? Offset credits are not allowed. This is different than substitution (also not allowed under the guidelines). See also subsequent comment in line 149.

147. **Original**: Revised 38 5 9.2 TE WEIDEMA

To avoid confusion, the term “step” in this context should only be used about the ISO procedure. The unnecessary overlap between step 2 and 3 can be avoided by deleting the heading here. Delete

148. **Original**: Revised 38 6-14 9.2 TE WEIDEMA

This text repeats what is already covered above. Delete

149. **Original**: Revised 38 14-17 9.2 TE WEIDEMA

This is based on a misunderstanding of these standards. PAS 2050:2011 clause 8.5 reads: “Where energy production from CHP is exported to a larger system (e.g. export of electricity to a national electricity network), the avoided GHG emissions arising from the exported energy shall be allocated in accordance with 8.1.1.” Clause 8.1.1 describes the standard steps 1a and 1b of ISO 14044. Delete

150. **Original**: Revised 38 17-19 9.2 TE WEIDEMA

This sentence is unclear. Reference to ‘footprint’ removed and description changed

151. **Original**: Revised 38 19-23 9.2 TE WEIDEMA

The danger for improper interpretation when several LCAs are combined is particularly high since they apportion different system models and/or allocation methods are combined. This should be reflected in the text. This discussion has been removed.
This description ("total value of the flow less than 1 percent") is not consistent with the definition of residual (page xiv: "Materials with economic value are not considered residual"). Based on the description here, it is not obvious what is the purpose for isolating "residues" from other co-products. The mere fact that the revenue from these outputs is low, zero or negative cannot justify a separate treatment. Nor can the fact that "the upstream and production process that produce the outputs are not deliberately modified for the outputs" be a justification for treating these outputs differently from other co-products. The separate definition and description thus becomes an unnecessary complication. The necessary treatment of the residues will contribute emissions to the determining product, just like any other non-determining co-product or waste.

Delete

This comment is from a consequential perspective: in which all emissions are assigned to the determining product and avoided emissions resulting from byproducts subtracted from the total. In an attributional perspective, and for purposes of providing clear guidance in these documents, the classification of materials as co-, by-, products, residuals or wastes which may or may not, depending upon the classification, carry upstream burdens into downstream processes remains valuable.

Replace bullets P35:25 with:

• They are sold in the condition in which they are created in the process and do not contribute revenue to the company;
• The upstream and production process that produce the by-products, and the by-product has a subsequent use. There may be value-added steps beyond the boundary of the poultry system under study, but these activities do not impact the poultry system calculations in these guidelines.

Please clarify. This sentence is in clear contradiction with the hierarchy. see row 151

Physical and economic allocation. Guidance is not sufficient as it leaves too much room for subjective interpretation.

Give many more examples where different allocation methods should be selected or cannot be selected. In case of economic allocation, more guidance is needed (world average price? Local price? Actual economic value or average over a time period…)?

We can create additional examples
Decline. This is not speculation but a reasoning why economic allocation is used. While we agree that different cuts have different markets, for purposes of this guidance, with the intent of narrowing choices and favoring harmonization, we do not allow different burdens to be assigned to different cuts of meat. As part of the FU definition, the fraction of edible product should be specified, so that differences in the edible portion of different cuts can be included this way.

Accept proposed change: delete from allocation chapter, and modify at section 11.3. While worst case in EU may be 45% empty returns, this may not be the case elsewhere, and the recommendation is to take 100% empty returns when the practitioner chooses not to find specific information—it is not intended to be a default value for all studies. Replace with: It is good practice to provide a best estimate with a corresponding uncertainty, per the requirement in section 10.4.

Removal “below”

The recommendation of this guidance is to apply causal reasoning for all situations of co-production, i.e. subdivision according to physical causalities for all situations of joint production. The guidelines are intended to support attributional LCA. As such the use of system expansion is generally restricted.

Response: The recommendation of this guidance is to apply causal reasoning for all situations of co-production, i.e. subdivision according to physical causalities for combined production and economic allocation for joint production.

The speculations here are irrelevant when applying subdivision or system expansion to all co-products. The purpose of these guidelines should be to make it easier for the reader, not more difficult. It does not seem helpful and adequate to leave the choice of allocation method open. The purpose of these guidelines should be to make it easier for the reader, not more difficult. Each allocation method provides an answer to a specific question, so when combining several different allocation methods within the same study, both the question and the answer is obscured. Consistently applying system expansion for joint production provides an unambiguous answer to the question of the consequences of a decision, which is the answer is obscured. While applying system expansion for various edible meat components (e.g. carcass cuts and edible offal) and other inedible co-products such as hide, blood and renderables (we are willing to assist the authors on this, if desired)

9.3.1

This text is not on allocation but on data sources. It is a duplication of the text in Section 11.3. Anyway, to apply worst-case estimates is not a useful recommendation or requirement. Good practice must be to provide a best estimate with a corresponding uncertainty, of the requirement in section 10.4, 2nd bullet. Anyway, 100% empty return trips can hardly be called worst case. In Europe, the worst national average for empty trips is 45% (for Cyprus).

Table 1

Definitions and explanations

...“mechanistic algorithm” calculating what? Could you give an example? (same page 44 Line 25)

Accept proposed change: delete from allocation chapter, and modify at section 11.3. While worst case in EU may be 45% empty returns, this may not be the case elsewhere, and the recommendation is to take 100% empty returns when the practitioner chooses not to find specific information—it is not intended to be a default value for all studies. Replace with: It is good practice to provide a best estimate with a corresponding uncertainty, per the requirement in section 10.4.

The recommendation of this guidance is to apply causal reasoning for all situations of co-production, i.e. subdivision according to physical causalities for all situations of joint production. The guidelines are intended to support attributional LCA. As such the use of system expansion is generally restricted.

Response: The recommendation of this guidance is to apply causal reasoning for all situations of co-production, i.e. subdivision according to physical causalities for combined production and economic allocation for joint production.
It is not only from a nutritional perspective that spent hens are equivalent but also, and more importantly so, from a practical perspective, in that the products fulfill similar roles in a meal. The consistency with the treatment of other meat cuts should not be stressed too much, since this is really a different, less important, and optional choice whether these should be treated together or individually, depending on the scope of the study.

Add “and practical” after “nutritional” in line 34, and “and practical role in a meal” after “nutritional value” in line 1 on page 41. Delete the rest of the paragraph. accept proposed change

I guess the term ‘delicacies’ is linked to specific cultural contexts. Avoid the use of such terms! accept proposed change

The proper assessment of the manure on the farm level can be only achieved when considering the feed use and thus the feed conversion by the animals.

The reference should be made to the SFIS study to guarantee consistency between the Animal Feed Guidelines and the present document. SFIS study not available on IFIF website; citation not possible at present.

It was based more on the practicality of broiler data being available. Accept proposed change except substitution.

This justification is provided in section 9.3.4. The reference to follow-up questions is not clear.
Estimates of broiler production are always available. Therefore no need to resort to biophysical allocation for spent birds. Rendering is a process prior to use of cull birds in pet food and has a clearly valuable product that substitutes the marginal protein source in pet food (soy meal), and additionally produces poultry fat that substitutes other food grade fats. The revenue-based system expansion for meat processing requires a little more text to be adequate. In the case of full utilization of residuals (shells/broken eggs), system expansion is required for the valuable product after treatment. In any case, the treatment activity needs to be included. In second row (spent birds): Delete Biophysical causality and second sentence in Basis. In the third row (cull birds): Delete Biophysical causality and change Basis to "Rendering of cull birds provide protein rich by-products that substitute soy meal as the marginal protein source in pet food and poultry fat that on the margin substitutes other food grade oils. Some cull birds may be treated as waste. For Revenue in the fourth and fifth row: Add "- based system expansion" after "Revenue", change "allocation" to "system expansion" and add ", taking into account when relevant, also differences in consumption activities based on differences in functional units and applications" before the last dot. For Residual in the fifth row: Change the text under Basis to "Shells and broken eggs are seldom fully utilized, which means that a marginal increase in supply should be regarded as additional waste. In case of full utilization (e.g. for animal feed) the avoided product (e.g. marginal soy protein) shall be subtracted from the burdens of treatment."

The recommendation in the initial text on p.42 is not in line with the physical causality, and is inconsistent with the recommendation in the section on p. 43. The suggestion here is to merge the two paragraphs into a consistent requirement. Replace by: "Animal manure is always a by-product that varies with the amount of animal production. All consequences of this shall therefore be assigned to the determining product of the animal production. This includes both the on-farm manure handling, the application of the manure on the field and the resulting field emissions. We understand the comment regarding physical causality to refer to the covariance of manure production with animal production. If this is the intent, we disagree that the recommendation is in conflict with the principle of physical causality. Treating manure as a residual does not imply that its production is not related to animal production; it is an accounting scheme to divide the effects of manure management between the producing system (animals) and the receiving system (crops), which is an appropriate procedure in an attributional LCA (we agree it is not in a consequential assessment). There is no recommendation in the section referred on page 43. That text describes the situation followed for a consequential/system expansion approach for situations when the recommendation on page 42 is not followed (and in that sense, since only one approach can be followed, they are of course inconsistent).
Animal manure is always a by-product that varies with the amount of animal production. All consequences of this must therefore be assigned to the determining product of the animal production. This includes both the on-farm manure handling, the application of the manure on the field and the resulting emissions. When the manure displaces artificial fertiliser, the net emissions from the field application thus become those of the manure minus those of the corresponding amount of displaced artificial fertiliser. The substitution of manure as fertiliser results in different emissions from the field than from inorganic fertilisers. When the manure displaces artificial fertiliser, the net emissions from the field application thus become those of the manure minus those of the corresponding amount of displaced artificial fertiliser. Therefore substitution shall require assignment of the field emissions to the animal product, with a subsequent substitution credit of both the production and field emissions associated with the substituted inorganic fertiliser. It is not required to identify the specific inorganic fertiliser products that are substituted. The field crops require fertilisation in terms of specific nutrients, not specifically manure or artificial fertiliser. Thus, the fertilisation requirements of the field crops shall be modelled as a demand to the general market for each required nutrient. This is then met by a supply from the uncontracted suppliers of fertiliser, which does not include manure, due to this being constrained by the demand for the animal products. Consequently, the emissions from the field crops shall be modelled fully and exclusively as the emissions resulting from this marginal supply of artificial fertiliser. This procedure results in a clean separation of the emissions caused by the animal system and those caused by the crop production.

Utilization of manure as fertiliser results in different emissions from the field than from inorganic fertilisers. When the manure displaces artificial fertiliser, the net emissions from the field application thus become those of the manure minus those of the corresponding amount of displaced artificial fertiliser. Therefore substitution shall require assignment of the field emissions to the animal product, with a subsequent substitution credit of both the production and field emissions associated with the substituted inorganic fertiliser. It is not required to identify the specific inorganic fertiliser products that are substituted. The field crops require fertilisation in terms of specific nutrients, not specifically manure or artificial fertiliser. Thus, the fertilisation requirements of the field crops shall be modelled as a demand to the general market for each required nutrient. This is then met by a supply from the uncontracted suppliers of fertiliser, which does not include manure, due to this being constrained by the demand for the animal products. Consequently, the emissions from the field crops shall be modelled fully and exclusively as the emissions resulting from this marginal supply of artificial fertiliser. This procedure results in a clean separation of the emissions caused by the animal system and those caused by the crop production."

Delete the word “Substitution.”

Accept proposed change

This text is highly confusing. Since marginal inputs of energy should be used when electricity is used (cf. ISO 14049, clause 6.4) then it must also be marginal energy that is used when substituting inputs. As also discovered by Blonk (2010), the system becomes mathematically unsolvable if averages are used for system expansion. And there seems to be no justification for making different rules for the energy by-product when it is sold relative when it is used in house or given away for free, which would also be inconsistent with the recommendation in section 11.7.1.

Delete.

This section has been re-written from an attributional perspective, and the discussion regarding energy substitution has been removed as suggested.

The “heading” is superfluous.

Delete.
Stakeholders’ Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)

178 Original Revised 43 11ff 9.3.3 EC, JRC, IES, Sustainable Assessment & Monitoring Agricultural Resources Units
Substitution of manure as fertilizer. The proposed methodology is ok and has also been used by Weiss and Leip (2012) and GGLES (Leip et al., 2010). However, according to current standard methodologies emissions from fertilizers are varying mainly due to fertilizer production emissions rather than on-field N2O emissions. A national/regional fertilizer mix (for the crop for which manure is substituted) could be used as a good proxy if no specific data are available. However, more problematic is the question of manure is applied to crops in higher quantities than a farmer would apply mineral fertilizer? Then only a (unknown?) fraction of manure can be substituted (credited) and the remaining must be treated as waste.

Give substitution-conversion in NPK quantities rather than mass of manure/ammonia nitrate etc… Discuss problem of over-fertilization with manure.

The guidelines have been revised to be more strictly attributional, restricting the use of system expansion to specific cases. We accept the recommendation that a regional fertilizer mix is a suitable substitute in case of a scenario analysis using system expansion to handling multifunctional issue of manure production. Regarding over application of manure: we understand this should be treated in the same manner as over application of inorganic fertilizer which results in additional nutrient runoff and nitrous oxide production which would be attributed to the livestock product. This will require separation of the beneficial (fertilizer) and waste treatment characteristics of the single application of manure.

Replace p.43 L11 with: This guidance strongly recommends considering manure as a residual material and accounted as described below.

179 Original Revised 43 18ff 9.3.3 EC, JRC, IES, Sustainable Assessment & Monitoring Agricultural Resources Units
Co-product of manure. Reasoning is not sufficiently justified. If manure is sold by farmer A and purchased by farmer B for the purpose of using as fertilizer, there is no reason why this should be treated differently than in the case above. If farmer A and B form a consortium, suddenly the emissions change?

Consider.

Manure discussion completely re-written.
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<td>Residual. The text is unclear. The question of what to allocate to manure and what to the bird (point of separation) is inherent also for the previous points, while here it is treated as an extra option. It is not convincing that the separation at the point of excretion leads to a separation of production. Assume a situation a farmer increase feeding without an effect on production, only higher manure excretion and uses the manure efficiently to a crop. Is it fair then to allocate the additional feed cultivation emissions to the product? Also the separation at field application is very relevant for system expansion, as N losses during manure storage and management determine the equivalent of fertilizer that is substituted. Text not mature.</td>
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<td>Manure discussion completely re-written.</td>
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<td>‘status quo to manure in LCA’ … this has no real meaning without references (and also mentioning studies where other solutions have been used)</td>
<td>Delete statement. Revise paragraph with whole section.</td>
<td>Stakeholders</td>
<td>Replace p44 L8-18 with: If manure is classified as a waste – only in situations where it is disposed of by landfill, incineration without energy recovery, or sent to a treatment facility – then all on-farm emissions shall be assigned to the animal live bird product. Emissions associated with the final disposition of litter as a waste are within the system boundary and must be...</td>
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Replace by: “In commercial processing of poultry products, as a single production unit, the main meat products have different functions and markets than the remaining co-products that are not edible by humans. Therefore allocation based on physical attributes (e.g., mass, protein or fat content) is not appropriate and shall not be employed. However, for the multiple determining edible products, for example chicken feet and chicken meat, which serve a common food market, the net induced changes in consumption may be insignificant, so that the system expansion may be approximated by a simple revenue allocation; or the products may even be grouped together as one average product, depending on the scope of the analysis. Likewise, secondary rendering products that substitute the same products (for example blood, bone, and feather meals that all displace soy as the marginal protein source) may be combined and treated as a single commodity.”

It is unclear why the impracticality of modeling should not be considered as a rationale for simplification. The rationale provided by the reviewer can be adopted in addition. Regarding the requirement of grouping products: it is understood that this is optional in the practice of LCA; however, one goal of this document is to restrict options, and this is one case in which a simplification is enforced. Replace P44 L21-32 with: In commercial processing of poultry products, as a single production unit, the edible products have different functions and markets than the remaining co-products that are not edible by humans. Therefore allocation based on physical attributes (e.g., mass, protein or fat content) is not appropriate and shall not be employed. However, for the multiple determining edible products, for example chicken feet and chicken meat, which serve a common food market, the net induced changes in consumption may be insignificant coupled with the complexity of physical modeling of the processing facility (as the basis of a physical causality relationship), leads to a simple revenue allocation of the similar products grouped together as one average product. Likewise, secondary rendering products that substitute the same products (for example blood, bone, and feather meals that all serve as a marginal protein source) shall be combined and treated as a single commodity. It is recognized that differentiation among products within the average commodity may, in some situations, be desired; however, for purposes of compliance with these guidelines this additional differentiation is not permitted.

Add the following text page 44 line 32: Table 3 provides example mass and revenue based allocation ranges for chicken meat processing in Australia. Also, delete last column (SE) in Table 3.

Secondary data may sometimes be of higher quality than primary data. Add “, of lower quality,” after “available” Accept the proposed change

Include a citation to the PEF guide
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<td>Discussion on use of proxy-data – depends much on who is doing the assessment. Farmers, actors in the supply chain should not be allowed to use proxy data, as it can be expected that they have knowledge about their system. Policy makers might not need so, i.e. They could simply use broiler impact intensities for turkey production if no specific study is available?</td>
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<td>Ge</td>
<td>EC, JRC, IES, Sustainable Assessment &amp; Monitoring Agricultural Resources Units</td>
<td>Provide reference to PEF Guide when dealing with Data Quality Assessment</td>
</tr>
</tbody>
</table>
196

Original Revised
196.51 Table 4 1e Un. Guelph

Last row: yes, but data related to production may depend on the market price. In this case there are few or no true representative years. It is the same with production depending on the climate/weather such as crop yields.

Therefore, discussing the benefits of using either average data in the calculations or averaging the results of several calculations would be extremely useful in these guidelines.

The connection of data availability to market price is not obvious. The intention of temporal representativeness is to minimize the chance that results based on anomalous behavior in a single year do not distort the results from the recent average behavior. For example significantly longer than average yields for corn in 2012 in the US could markedly change the result from the 5 year average.

This is discussed in section 12.1

197

Original Revised
197.52 Section 1 0.4 1e Un. Guelph

Precise uncertainty evaluation is often very difficult to obtain. However, sensitivity analyses are always possible to do and offer useful information on the input data.

In our opinion, emphasis should be put on this kind of analysis. At least a short section should be added here.

198

Original Revised
198.52 1 10 10.3.2 Te. ENEA

It is not clear what data quality indicators are and where they can be found. I visited the suggested page by WRI/WBSCD but I did not find anything about data quality indicators.

This point should be clarified.

The WRI/WBSCD website does not discuss data quality indicators; however, it does provide guidance on uncertainty assessment which is related to data quality indicators. Some additional explanation and references related to data quality indicators has been added to the text: WRI/WBSCD has published additional guidance on quantitative uncertainty assessment which includes a spreadsheet to assist in the calculations. Annex 12 of the ILCD handbook (European Commission et al., 2010) provides detailed discussion of data quality and data quality indicators (DQI), which include the dimensions of: Technological, Geographical, and Time-related representativeness; Completeness and Precision / uncertainty; and Methodological appropriateness and consistency.

Data collected from primary sources should be checked for validity by ensuring consistency of units for reporting and conversion as well as material balances to ensure that, for example, all incoming materials are accounted in products leaving the processing facility.

199

Original Revised
199.54 2-5 11 11.1 Box 1 Ge, Te IRIF, FEFANA

The data requirements on feed are only complete when considering the effects of feed additives on the feed conversion.

Include the reference to the IFIS study

The study is not available on the IFIP website for the project, and can thus not be cited at present. In addition, we consider that the effect of the ration formulation should be captured in the farm level data where ration consumption coupled with reported production explicitly captures the formulation effect on feed conversion: feed consumed/LW produced is a direct measure of FCR, so will be automatically included in the assessment.

200

Original Revised
200.55 2-4 11.2 Figure 13 TE WEIDEMA

When avoiding allocation, the wording of box 16 should reflect this.

Box 16, last 3 lines: Change to: “System expansion may be required to isolate each FU” Decline. Guidelines are intended to be primarily attributional, and the current wording reflects that goal.
There is no contradiction, so a "but" is not meaningful here. Change "but" to "and".

Last two paragraphs seem to be out of context. Replace with: At the cradle-to-farm gate stage, previous research has shown that the largest source of GHG emissions is feed production (Wiedemann and McGahan, 2011; Wiedemann et al., 2012; Leinonen et al., 2012a, b). Manure management also contributes to emissions; and is directly related to feed quality and quantity consumed. Clearly, an important first step is to define the feed types used and their feed quality characteristics.

"This section refers to identifying the type, quantity and characteristics of feed, which relates to both upstream impacts (the domain of the LEAP Animal Feed guidelines) but also downstream impacts from manure management, which is the domain of this methodology". This assessment makes only sense when considering AP and EP on the basis of using feed additives.

What you mean by "reticulation". Typo: should be circulation.

Accounting of emissions from lost feed. Agree that emissions occurring from lost feed need to be accounted. However, lost feed might serve also as fertilizer, replacing other types of fertilizers. Is this considered in the feed document?

If feed is lost into the manure, then it would be accounted with the manure in the animal guidelines. Feed loss in storage would be considered in the feed document (Theunis - is that considered)
Table 1: Method for manure production. It is not clear why a modelling approach is recommended for manure production. The LCA practitioner should first attempt to use primary data, i.e. feed intake – products (meat, eggs, other (co) products) = manure. Using a default retention factor is likely to introduce bias in the data and create inconsistencies. Furthermore, production data will need to be collected anyway. Also, such a method would make a differentiation into different feeding phases obsolete in some cases, when total feed intake over the whole life and total product generation over the whole life are used to calculate manure production.

Decline: This discussion is not referring to quality of feed, but to characteristics of feed useful for estimating the quantity of excreta (for which measurements are not typically available). If SFIs are used in the specific ration and have an effect on the quantity or character of the excreta, then these characteristics should be captured – as indicated in the existing text.

Again, with livestock having short lifespan such as broilers the between input data, such as animal diets, and the output data and create inconsistencies. That is the reason why mentioning “average ration” is a little confusing. There should be more details on the between the feed ration provided for the life cycle of the animal (for example 1.5months) and the time unit which is 1year

We agree that the practitioner should first use primary data. However, it is not immediately clear that the model proposed (feed intake minus products equals manure) is a more accurate approach for estimating manure production because it ignores conversion of feed through basal metabolic activities into carbon dioxide and water and, for nitrogen, the assumed retention factor would be replaced by an assumed protein content of the products. The best approach is of course to have measured weights of manure along with specific composition of volatile solids and nitrogen content. We also agree that using the default retention factor is less preferred than using a specific retention factor for the flock in question, if it is known. However it is unclear how a default retention factor introduces bias and creates inconsistency – it would seem to do precisely the opposite (in a comparative sense), while for an individual flock, there should be more details on the between the feed ration provided for the life cycle of the animal (for example 1.5months) and the time unit which is 1year

Response

The SFIS report does not seem to be available on the IFIF website for the project, thus no reference is currently possible.

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<th>Orig.</th>
<th>Revise d</th>
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<th>Page no.</th>
<th>Line no.</th>
<th>Chapter no./annex/spreadsheets/issue name (e.g. 3.1)</th>
<th>Paragraphe/figure/table (e.g. table 1)</th>
<th>Type of comment</th>
<th>Stakeholders</th>
<th>Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)</th>
<th>Response</th>
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<tbody>
<tr>
<td>212</td>
<td>Original</td>
<td>Revised</td>
<td>60</td>
<td>7</td>
<td>te Un. Guelph</td>
<td></td>
<td>Clarity and modification needed</td>
<td>&quot;Meat chickens&quot; is a little vague. How about &quot;broilers&quot; or &quot;non-laying hens&quot; (which would be more appropriate when considering the denomination given line 14)? Also, it is not &quot;excretion&quot; only but &quot;nitrogen excretion&quot;</td>
<td>Accept recommendation</td>
<td></td>
</tr>
<tr>
<td>213</td>
<td>Original</td>
<td>Revised</td>
<td>60</td>
<td>8</td>
<td>(equation s)</td>
<td>te Un. Guelph</td>
<td>Change needed</td>
<td>Mention the unit in the text but not at the end of the equation. This comment applies to all equations.</td>
<td>Accept recommendation</td>
<td></td>
</tr>
<tr>
<td>214</td>
<td>Original</td>
<td>Revised</td>
<td>60</td>
<td>9</td>
<td>te Un. Guelph</td>
<td></td>
<td>For clarity purpose</td>
<td>The &quot;bird phase&quot; should be defined here and/or examples should be provided.</td>
<td>Insert at pages 60 line 9 following &quot;bird-phase&quot;-breeding, hatchery, or breeder</td>
<td></td>
</tr>
<tr>
<td>215</td>
<td>Original</td>
<td>Revised</td>
<td>60</td>
<td>25</td>
<td>te Un. Guelph</td>
<td></td>
<td>Change needed</td>
<td>Before Fl, recall what VS is and mention its unit.</td>
<td>Insert at line P60: 22: Volatile solids (VS) excretion… The unit is given in the equation as KG.</td>
<td></td>
</tr>
<tr>
<td>216</td>
<td>Original</td>
<td>Revised</td>
<td>60</td>
<td>26</td>
<td>te Un. Guelph</td>
<td></td>
<td>For clarity purpose</td>
<td>Mention 0.8 directly and not the percentage. Same for 0.1.</td>
<td>Accept change</td>
<td></td>
</tr>
<tr>
<td>217</td>
<td>Original</td>
<td>Revised</td>
<td>x</td>
<td></td>
<td>Te EC, JRC, IES, Sustainable Assessment &amp; Monitoring Agricultural</td>
<td></td>
<td>General statement: I appreciate the use of existing standard IPCC methodologies as much as possible. This ensures that data are consistent with the estimation of GHG emissions for national inventories, generates synergies between GHG and LCA practitioners and reduces redundancies.</td>
<td>No response required</td>
<td></td>
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</tbody>
</table>

The default retention could introduce a bias in terms of the nitrogen balance.
The IPCC reference should be quoted.

Accept recommendation. Dong et al.

Which one to choose, 1.5 or 2%? This is the range reported in the literature, and can be used as part of the uncertainty assessment.

Decline. The fact that the animal produced the manure does not induce a physical causality to the connection of the emissions to the animal - this is an accounting decision. These guidelines recommend an attributional approach, for which the point of separation is the farm gate with regard to the litter, so that on farm storage is assigned to the animals while the field emissions are assigned to the crops.

The color scheme was changed at print time. Change ‘orange’ to ‘green’.

Change the numbering from 8 to 15.

This is a very interesting figure. To be complete, the "housing N2O emissions" should be included also.

Account for all manure emissions in this guideline instead of splitting them up between the guidelines. Due to the attributional nature of the guidelines, and a recommendation to treat manure as a residual (i.e., a by-product which carries no upstream burdens to downstream processes), the field emissions from manure application are assigned to the crop production which is the domain of the feed guidelines.

Additional explanation added: As in equation 9, to convert nitrogen loss to nitrous oxide.
Instead of "mass of manure N", how about "N content in manure (kg)"?

Add the following line 27: the final on-farm results are calculated on the basis of the cumulative inventory of inputs and emissions, each converted to the appropriate impact category based on the impact category characterization factors (e.g., for climate change due to electricity, the total annual number of kilowatt hours of electricity consumed is multiplied by the national emission factor kilograms CO2eq/kWh). Once each of the inventories has been converted to the appropriate impact category metric, they are summed and divided by the total annual production to be reported on a per functional unit basis.

The term "exclusion" is ill chosen
Change "cut-off criteria for exclusion" to "treatment of"
Accept change

This should apply to all waste treatment, not only on-farm
Delete "on-farm"
Accept change

To apply worst-case estimates is not a useful recommendation or requirement. Good practice must be to provide a best estimate with a corresponding uncertainty, cf. the requirement in section 10.4, 2nd bullet. Anyway, 100% empty return trips can hardly be called worst case. In Europe, the worst national average for empty trips is 45% (for Cyprus).
We have adjusted the text to indicate good practice requires an estimation plus uncertainty, with the caveat that if this is not done then, 100% returns should be the default. Section 11.3 revised.

Update to account for suggested change in the example referred to.
Change "is achieved through an economic or mass allocation, as shown in a subsequent example" to "using different allocation methods is shown in Box 4."
Accept change

The economic value is irrelevant for the physical causality
Delete "economic value and"
Accept change

Box 2 presents an example calculation for meat processing facility.

This example removed.

Add a reference to the box
Stakeholders' Comment: (justification for change of technical aspects must be supported by either scientific literature or technical documents)

240 Original Revised 70 4 11 11.7.2 Box 2 Ge IFIF–FEFANA Mistake copy and paste "lamb" (?) Accept change

241 Original Revised 70 5-6 11.7.2 Box 4 TE WEIDEMA The economic value is also used in the system expansion example Decline. System expansion example for manure has been removed

242 Original Revised 70 9 11.7.2 Box 4; Table 10 TE WEIDEMA Expand the example to include system expansion if required. Space can be saved by deleting the "Average mass" column, since the information is redundant with the % of total meat. For easier understanding, add two rows. One "sum edible" below "Wings" and one "sum total" at the bottom, thus giving 8 rows of numbers in total. For easier understanding, add the formulae and the parameters EA and MA in the table. Add two rows: One "sum edible" below "Wings" and one "sum total" at the bottom, thus giving 8 rows of numbers in total. Use the following 7 column headings: Mass% (M); Revenue% (R); % by economic allocation; Induced production in % of TM ([R*100]/EA); Reduced consumption in % of TM ([1-100]/C); Net change in consumption in % of TM (M*above percentage available for system expansion (for all 3 rows)); For easier understanding, add the formulae and the parameters EA and MA in the table.

The resulting 7*8 matrix is filled in this way: Column 1: 33.37;33;37;MA = 76;6.4;7.6;10;TM=100; Column 2: 35;41;13;EA = 89;6;3;2;100; Column 3: 38.64;43.33;7.03;89;6;3;2;100; Column 4: 39.33;46.07;14.61;100;=M*above percentages available for system expansion (for all 3 rows); Column 5: -60.67; -53.93; -85.39; ; ; ; Column 6: 51.24;48.56;170.41; ; ; ; Column 7: -9.43; -5.38;85.02; ; ; ; Change the explanatory text below the table to: "The table shows—maybe surprisingly—that the price (revenue/mass) for wings is relatively high, compared to the other meat cuts. For the economic allocation result, the meats are grouped, so that the allocation factor for the meats become mass%/EA*MA. For the (ungrouped) inedible parts, the economic allocation factor is the pure revenue%. In the 4 last columns, each row shows the consequences of system expansion: The demand for the amount TM of a specific meat type first provides a revenue that induces a production of the amount shown in column 4. This is equal to the specific meats' proportion of the total revenue for all 3 determining products. Since the induced amount is less than the demanded amount, the remaining amount must come from other consumers' reduction in consumption of that meat type (column 5). At the same time, the induced production supplies an additional amount of the non-demanded meat cuts, thus inducing an increased consumption of these (column 6), since all markets must be cleared. The net change in consumption is shown in column 7. The net change in consumption is low for the dark meats and breasts, showing that these products could be grouped as one, without introducing any significant error. For wings, on the other hand, the change in consumption of other meat cuts is significant, which shows that it may not be reasonable to group the wings together with the other meat cuts. This is a direct consequence of the significant difference in price of the wings relative to the other cuts." Decline. This is consequential modeling; these guidelines are attributional.
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<thead>
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<th>Type of comment</th>
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<th>Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)</th>
<th>Response</th>
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<tbody>
<tr>
<td>243</td>
<td>Original</td>
<td>71</td>
<td>15 ff</td>
<td>12.1</td>
<td>Te</td>
<td>EC, JRC, IES, Sustainable Assessment &amp; Monitoring Agricultural Resources Units</td>
<td>Contribution analysis. As mentioned in the text this is very useful for determining choices on efforts for data collection etc. Thus, such a preliminary analysis should be done in the planning phase (see comment above). Placement of that issue in the initial part of the document might be more appropriate? Completeness check, sensitivity analysis and consistency check are more related to quality assessment than interpretation</td>
<td>To be discussed with the Secretariat</td>
</tr>
<tr>
<td>244</td>
<td>Original</td>
<td>71</td>
<td>15</td>
<td></td>
<td>Te</td>
<td>Un. Guelph</td>
<td>Guidance needed</td>
<td>Any guidance to do this “contribution analysis”? Brief description added, change to “… To do this, a contribution analysis shall be conducted to quantify the relative contribution of the different stages/categories/terms to the total result. A contribution analysis is typically presented as a normalized stacked column chart where each contributing element to the column is associated with a particular production stage (e.g., feed, transport, manure management, etc.). Such contribution analysis can be useful for various interests, such as focusing data collection or mitigation efforts on the most contributing processes.”</td>
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<tr>
<td>245</td>
<td>Original</td>
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<td>20</td>
<td></td>
<td>Te</td>
<td>Un. Guelph</td>
<td>“Especially impacts categories”. There is only one impact category considered in these guidelines (cf. 2.1). So, how to interpret the end of this sentence/statement?</td>
<td>Deleted</td>
</tr>
<tr>
<td>246</td>
<td>Original</td>
<td>72</td>
<td>11</td>
<td></td>
<td>Ge</td>
<td>Un. Guelph</td>
<td>Check</td>
<td>“Section 9” is not about data quality corrected to 10.3</td>
</tr>
</tbody>
</table>
This section presents interesting explanations but we are not sure that it is well presented. Could it be read again? More specifically, what do you mean by “knowledge uncertainty” (L12) or “process uncertainty” (L13)? Concerning the “variation and uncertainty of data” (L19), did you mean “range”? Etc.

This section is related to Section 10.3, data quality. Several sources of uncertainty are present in LCA. Lack of precise knowledge regarding the quantity of an input which is used or any emissions from a process contributes to the uncertainty in the result. Complex systems are also inherently variable, which also introduces imprecision in the final result. Imprecision arising from lack of knowledge can be reduced by collecting more data. It may be possible to reduce the influence of fundamental process variability on the results by disaggregating complex systems into smaller parts, but inherent variability cannot be eliminated completely. Third, the LCA characterization factors that are used to combine the large number of inventory emissions into impacts also introduce uncertainty into the estimation of impacts. In addition, there is bias introduced if the LCI model is missing processes, or otherwise does not represent the modeled system accurately.

Their interest and use should better defined. The two paragraph 12.2.1. and 12.2.2. should be better inserted and should be put in the general context of LCA. As they are presented, they are definitions only.

Inherent variability: This seems inconsistent with the recommendations earlier to use time averaged data to provide robust estimates or not differentiate between different cuts. So in some cases variability should be reduced by disaggregation of systems, for example if different markets are being served by different products with different impact, where disaggregation will help e.g. policy makers or consumers or food chain actors.

Inherent variability is not obvious; while it is true that different cuts may serve different markets, because the guidelines require grouping the edible products together, differences in markets do not affect the calculations. Regarding different products with different impacts, because of the grouping required in these guidelines each of the different meat cuts will have the same impact. Furthermore, other products (offal serving pet food market) will have different impacts.
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<thead>
<tr>
<th>Page no.</th>
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<th>Chapter/annex/spreadsheets name (e.g., table 1)</th>
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<th>Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)</th>
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<tbody>
<tr>
<td>250</td>
<td>5-6</td>
<td>12.2.3</td>
<td>E</td>
<td>WebDEMA</td>
<td>A normalised result cannot be used to say anything about the overall environmental benefit. Since it is a relative value, it can at best express the relative environmental improvement.</td>
<td>Change “greatest overall environmental benefit” to “largest relative environmental improvement.”</td>
</tr>
<tr>
<td>251</td>
<td>21</td>
<td>12.2.3</td>
<td>E</td>
<td>Un. Guelph</td>
<td>Addition</td>
<td>Add &quot;...data quality, allocation methods and impact etc....&quot;</td>
</tr>
<tr>
<td>252</td>
<td>9</td>
<td>12.2.3</td>
<td>E</td>
<td>Un. Guelph</td>
<td>Addition</td>
<td>For better precision: “The description of the input data and assessment methods shall be etc....”</td>
</tr>
<tr>
<td>253</td>
<td>15</td>
<td>12.2.3</td>
<td>E</td>
<td>Un. Guelph</td>
<td>Better precision needed</td>
<td>I suggest: “Possible negative or positive impacts on other etc....”</td>
</tr>
<tr>
<td>254</td>
<td>16</td>
<td>12.2.3</td>
<td>E</td>
<td>Un. Guelph</td>
<td>Better precision needed</td>
<td>same here: “Positive or negative environmental impacts etc....”</td>
</tr>
<tr>
<td>255</td>
<td>7-16</td>
<td>Chapter 12</td>
<td>Ge</td>
<td>Un. Guelph</td>
<td>For clarity purpose</td>
<td>There are three main parts in chapter 12: 1-Quality Assurance/Quality control (12.1 &amp; 12.2), 2-Conclusions, recommendations and limitations (12.3) and 3-Reporting (12.5, 6 and 7). The use of this structure could strengthen the last chapter. Finally, 12.4 should be put at the very end since it deals with the guideline itself and not the recommendations.</td>
</tr>
<tr>
<td>256</td>
<td>26-27</td>
<td>12.7</td>
<td>Ge</td>
<td>EC, JRC, IES, Sustainable Assessment Monitoring Agricultural Resources Units</td>
<td>Reference to PEF Guide for reviewer qualification</td>
<td></td>
</tr>
<tr>
<td>257</td>
<td>9</td>
<td>12.7</td>
<td>E</td>
<td>Un. Guelph</td>
<td>For clarity purpose</td>
<td>How about: “LCI modeling and calculations.”</td>
</tr>
</tbody>
</table>
258 **Original** Revised
76 10
10 Un. Guelph For clarity purpose
Minor change: "Results, interpretation and conclusions of the study."
Change to: Results and interpretation of the study.

259 **Original** Revised
76 27
27 Un. Guelph Guidance
Independency is crucial. So, how about: "Revisions shall be performed by independent reviewers."
Agree. However, the requirement of independent review is defined by the goal and scope of the particular study and is not a general requirement for all LCAs. No change made.

260 **Original** Revised
77 N/A 13
13 IEC
Are all these citations used in the text up to pg. 76? I think there are some confusion with Appendix B, 15. For some references
Will check for consistency

281 **Original** Revised
77- 80
13 IEC
Some citations do not provide enough information to be retrieved by anyone interested in the information
Provide web links for certain references

282 **Original** Revised
81- 101
13 IEC
Appendix A does not provide enough details for eggs and laying hens, especially in the first few pages
Will submit a proposal under separate email for the TAG to review

295 **Original** Revised
102- 4
4 IEC
Long list of references at the beginning of the paragraph does not seem to fit well within the text – Dekker et al., 2013 with 2013 listed twice
Review the sentence or delete these references

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`Modified. This document was prepared as part of the UN partnership for Livestock Environmental Assessment and Performance Partnership (LEAP) technical advisory group for poultry. The intention of this document is to provide an overview assessment existing studies and associated methods that have used lifecycle assessment for evaluation of poultry meat and egg supply chains. 18 studies have been identified addressing aspects of the poultry supply chain or egg supply chain(Bengtsson & Seddon, 2013; Boggia, Piastrelli, & Castellini, 2010; da Silva, Cherubini, & Soares, 2012; da Silva, Soares, & de Alvarenga, 2008; da Silva, 2011; Dekker, de Boer, Aarnink, & Groot Koerkamp, 2008; Dekker, de Boer, van Krimpen, Aarnink, & Groot Koerkamp, 2010; Dekker, de Boer, Vermeul, Aarnink, & Groot Koerkamp, 2010; Dekker, de Boer, Vermeul, Aarnink, & Groot Koerkamp, 2011; Dekker, de Boer, Vermeul, Aarnink, & Groot Koerkamp, 2013; Dekker, de Boer, Vermeul, Aarnink, & Groot Koerkamp, 2014; Dekker, de Boer, Vermeul, Aarnink, & Groot Koerkamp, 2015; Ellingsen & Aanondsen, 2006; Katajajuuri, Gfonroos, & Usva, 2008; Leinonen, Williams, Wissman, Duy, & Kyriazakis, 2013a, 2013b; Lesschen, van den Berg, Westerbeek, Witkx, & Oenema, 2011; Marino, Filipo, Nicolussi, & Badalamenti, 2011; Palm, 2010; Palmej, 2008; The Carbon Footprint of Products Calculation and Labeling Pilot Program, 2011, 2012; Verge, Dyer, DeSapio, & Worth, 2009; Weiss & Leip, 2012; Wiedemann, McGahan, Grist, & Grant, 2010; Wiedemann, McGahan, & Poud, 2012; Wiedemann & McGahan, 2011; Williams, Audsley, & Sandanski, 2009) . In the`
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<th>Chapter no./ annex/ spreadsheets name (e.g. 3.1)</th>
<th>Paragraph/figure/table/ no. (e.g. A.1)</th>
<th>Type of comment</th>
<th>Stakeholders</th>
<th>Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>264 Original</td>
<td>Revised 100-101 line 6, p. 100 to l. 14, p. 101</td>
<td>Appendix A6</td>
<td>1E</td>
<td>WE/ID/MA</td>
<td>When avoiding allocation by system expansion, this section becomes irrelevant.</td>
<td>Delete entire section A6.</td>
<td>Decline. The general approach of these guidelines is to not use system expansion, and thus the section remains relevant.</td>
</tr>
<tr>
<td>265 Original</td>
<td>Revised 106-108 N/A</td>
<td>15</td>
<td>ge</td>
<td>IEC</td>
<td>Are all the references cited used in Appendix B? I think there is some duplication with the references listed in section 13 of the core document</td>
<td></td>
<td>There may be overlap or omission between the citations as the purpose of Appendix B was strictly to evaluate the literature for LCA methodology, and not to support general understanding of poultry production.</td>
</tr>
</tbody>
</table>

Citation added to Appendix B.