	Page no.	Chapter no./ annex/ spreadsheets name(e.g. 3.1)	Paragraph/ figure/table /note (e.g. table 1)	Type of comment *	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change	TAG response
1	X			Te	Additives (more general: specialty feed ingredients)	Specialty feed ingredients instead of additives	Accept change
2	X			Te	Feed Additive (more general: specialty feed ingredients)	Specialty feed ingredients instead of feed additive	Accept change
3	VVII			Te	Emission Factor. The explanation is not only valid for GHG Emissions, but also for all other impact categories. The definition should be precised.	Amount of emissions emitted to the environment to soil, air or water expressed as equivalents	Accept change: "Amount of emissions emitted to soil, air or water environment expressed as equivalents"
4	XX			Te	Definition Primary activity data	Again, only focus on GHG, should be extended to all impact categories	Accept change
5	24	1		Te	Identification of opportunities to increase efficiency and productivity	What should be addressed: the efficiency of pig feed, the productivity of pig feed or the production of pig meat by using feed? This should be clarified!	The intention is to be generic, so as to cover all of the examples provided by the reviewer. No change made to the text
6	25	2.2		Ge	A more strict prescription on the methodology, including allocation and acceptable data sources, is required for product labelling or comparative performance claims.	Why the reference is made to labelling?	Labeling is often part of a type III EPD which requires a similar rigor in assessment (typically constructed from a PCR, which has strict methodological prescriptions), and therefore is similar to comparative performance requirements for an LCA. No revision made.
7	67	9.3.1		Te, Ge	Emissions at the farm level should be measured as an input-output balance, otherwise all impacts on Feed conversion ratio (i.e. climate, Specialty Feed Ingredients, animal welfare will not be considered!)	In pig livestock systems, the major determinant of GHG emissions is feed production and manure methane and in some cases, N2O emissions (potentially for systems using the bedding or dry stack handling for manure), and the driver of these is feed intake and characteristics and technical performance of the animals (expressed as feed conversion ratio). Consequently, if the activities, inputs or emissions cannot be separated, the preferred method to account for multi-functional processes and co-products shall be a biophysical approach based on feed intake associated with the different animal species or co-products as an input-output-balance (Reference PRFCR Pilot on Feed for Food producing animals).	The meaning of "input-output-balance" is not clear. Does the reviewer mean that a mass balance should be enforced in the inventory? If so, this is covered in section 10.3.1 regarding data quality indicators. A full material balance on most farms is difficult because the exact character and quantity of manure is often only approximately known. In addition, this section refers to approaches for calculating allocation factors, and not for overall inventory of the farm. Further, the section is not referring to computation of the feed conversion ratio, rather to biophysical approaches (discussed later in section 9.3) without the allocation factors used to distribute whole farm emissions (should be based on data that account for all factors mentioned by the reviewer). F Several references to this document; which was not available during first round of replies. FEFAC. 2016. "PEFCR Feed for Food Producing Animals." https://www.mr.gov.pl/media/23552/pasza_metodyka.pdf

							The TAG found no reference to "input-output" balance in the document. No modification made to the text.
8	76	10.2.1		Te, Ge		In cases like this, when a model is used to estimate the emission, the input and output data used for the model balance shall be measured	If the output data from the model could be measured, there would be no need for the model. No modification made the text
9	81	10.4.3		Te,Ge	Asa soon as feed conversion ratio and data collection are mentioned, the link should be made to the input-/output balance.	Agricultural processes are highly susceptible to year-to-year variations in weather patterns. This is particularly true for crop yields, but may also affect feed conversion ratios when environmental conditions are severe enough to have an impact on an animal's performance. Depending on the goal and scope definition for the study, additional information may be warranted such that either seasonal or inter-annual variability in the product system efficiency can be captured and identified by simple input-/output balance (Reference PRFCR Pilot on Feed for Food producing animals).	See response to **comment 7**
10	82	11.2	Box 1	TE, Ge	Animal performance on the farm level is the most important factor to mitigate environmental burdens of pig production at farm level. Specialty Feed Ingredients play a central role for that (as mentioned in the feed guidelines, the PEFCR pilot for feed and the SFIS-study 2014).	Pig production primary data shall include a precise description of the production system and its targets. For example, growth rate, final weight, actual animal performance (e.g. influenced by climate, feed properties and specialty feed ingredients), product and market specifications. The systems may be quite different in various countries or regions. Input-output balances on the farm level shall be applied. Primary data regarding heating and ventilation, lighting, and other energy uses associated with feed and water management shall be collected	The parenthetical revision is adopted. The meaning of input-output balance is not clear, and thus not adopted this time.
11	84	11.2.2		Ge, Te	Description of upstream and downstream effects of the pig feed	Because of the diversity of rations and the fact that rations production contributes to environmental impacts, the ration shall be carefully evaluated and accurately represented in the analysis and assessment of pig supply chains. In addition, different production systems result in different environmental conditions for the animals (e.g., temperature) that can affect the maintenance energy needs and thus the feed conversion ratio (e.g. through addition of specialty feed ingredients), further underscoring the need for primary data on feed consumption by means of an input-	The parenthetical revision is adopted. The meaning of input-output balance is not clear; an alternate phrasing is adopted: "… by full accounting of input products at the farm level".

						output balance. (Reference PRFCR Pilot on Feed for Food producing animals).	
12	85	11.2.2		Te, Ge		The LEAP Animal Feed Guidelines, which provides support for environmental life cycle assessment from the cradle-to-mouth, shall be referred to in this assessment. In practice, there is wastage of feed at various stages between harvest and feeding and this shall be accounted for. To investigate the impact of animal performance, expressed through the feed conversion ratio as a consequence of climate, techniques, feed and use of specialty feed ingredients, input output balances at farm level shall be applied.	Accept as the following modification: To investigate the impact of animal performance, expressed through the feed conversion ratio as a consequence of the effects of climate, management techniques, feed and use of specialty feed ingredients, full accounting of feed and other inputs and live weight production, at farm level shall be applied.
13	85	11.2.2		Te, Ge	Advanced feed formulations show a couple of advantages, which all together are significant for the costs of environmental management.	It may occur that some feed formulations might be more expensive (e.g. through the supplementation of specialty feed ingredients) but clearly result in improved animal welfare, reduced resource consumption and manure excretion and thus to lower GHG emissions, acidification potential and eutrophication, which further decreases the cost of environmental management (Reference SFIS study 2014)	Revision not adopted. the effects of specialty formulation will be captured in the normal course of execution of the lifecycle assessment. It is not the role of these guidelines to highlight specific potential effects of management practice decisions, but to provide a mechanism by which the effects of those decisions can be quantified.
14	iv	Table of content		te	In table of contents, Part 2 page 50-109 is missing		TOC updated.
15	xxii			te	Is it right that part 1 should start on page 23 after page xxii?		Page Numbering Corrected.
16	vii	Acknowledg ement		ge	Affiliation of Lisbeth Mogensen, instead of 'Danish Center for Food and Agriculture'	Is should be 'Aarhus University'	Corrected
17	x	Terms	Animal by-product	ge	Eventually mention the 3 EU categories		A regulatory term in the EU for livestock production output classified in EU in three categories mostly due to the risk associated to the bovine spongiform encephalopathy. This classification scheme is focused on public health, and is mentioned here to prevent confusion with the terms used in this guidance that relate to co-products, residuals, and waste.
18	xi	Terms	Conserved forage	te	Are not in the right alphabetic order.		Corrected.
19			Crop residue		'Crop residue' is a repetition.		Corrected.
20	xii	Terms	Carcass weight	ge	' …. Refers to weight after slaughter when the carcass is hung before in cold storage…' Eventually rephrase:	' …. Refers to weight after slaughter before cold storage…'	Adopted.
21	Xii and xiv	Terms	'Cull sows' and 'spent sows'	ge	Normally we use the term 'culled sows' for all replaced sows including sows sent to slaughter and used for human food chain. I think your use		We understand the concern. This is the reason we have included clear definitions in the glossary. We believe it is important to differentiate between

					of the term 'cull sow' create a risk that people can misunderstand it.		animals which are sent to slaughter versus those disposed animals which are replaced due to mortality or disease.
22	xiii	Terms	Litter	ge	Eventually add 'by the same sow'		Adopted.
23	24	2.1	Paragraph 2	ge	'Eutrophication' is not an additional impact category as already included in this guideline		Eutrophication removed from the list of additional categories.
24	25	3.1.		te	'Error! Reference source not found'		Corrected.
25	26	Figure		te	Figure number and heading is missing		Corrected.
26	27	3.1	Paragraph 1	ge	Eventually give a link to the 'LEAP Animal Feed Guidelines'		Now mentioned at this location.
27	28	4.2	Paragraph 1	te	The sentence starting with 'The selection of environmental impacts…' is given in duplicate		The duplicate sentence deleted
28	36 + 37	Figure 6.1 + 6.2		ge	Eventually explain CW = carcass weight (6.1), and include 'pig' in the heading (both figures)		Corrected.
29	39	6.2.2	Paragraph 2	te	'in The type'	'the'	Corrected.
30	40	6.2.3	Pragraph 2	ge	I tried to look up 'dirt floor' in the term definition page xii-> and could not find it there. Eventually it should be added		Definition added.
31	43	Figure 6.5			The capital letters and bars are not explained in the figure itself (Eventually write that this explanation is given in the text)		Added to figure title.
32	43	6.3	Paragraph 4	ge	'The relative widths of the arrows denote the average quality of…' 'Quality' is not clear to me please clarify. (Like for example at page 83, line 4)		Clarification added.
33	44	6.4	Paragraph 2 and 3	ge	Please clarify that this is about global pig production		The section heading states global pig production. Additional clarification for global GHG emission added
34	46	Figure 6.6		ge	Please include 'pig' in the heading		The word "pig" is added in the caption of figure 6.7; figure 6.6 already included the term.
35	49	7	Paragraph 1	ge	>< Page 24 (2.1) it was mentioned that eutrophication would be included		Eutrophication removed from the list
36	53	8.4.1.	Paragraph 1	te	'Error! Reference source not found'		Corrected.
37	54	Figure 8.1		ge	Evt. Explain 't' means transport		Corrected.
38	55	Line 1	Paragraph 1	te	'Error! Reference source not found'		Corrected.
40	62	9.2	Paragraph 1	te	It is figure 9.1 not 13		Corrected.
41	63	Section 'System expansion: ISO step (1b)		ge	I think there is a contradiction between the 2 sentences mentioning 'system expansion': 1) ',…… and exclude application of system expansion by means of substitution and restrict its use to situations in which 'expanding the product system to include the additional		The TAG recognizes that it is common practice to essentially equate the "expanding the system" with the substitution of a coproduct as a displacement of another product in the techno-sphere (substitution). It is the intention of these guidelines to preclude that approach to expanding

					functions related to the co-products' is acceptable' and 2) 'The alternative, consequential use of system expansion using an avoided burden calculated through substitution is not compliant with these guidelines'		the system, but to allow an expansion of the system to include multiple functions delivered by multiple coproducts. Thus, for example, and entire meat processing facility could be analyzed by taking the cumulative outputs of all products with their combined multiple functions as a single unit of analysis; in this case, of course, assignment of burdens to individual products is no longer possible. The contradiction mentioned is not clear based on the reviewer's comment.
42					I agree about the example that sow production is a multiple production.		OK
43					But for example, at the slaughterhouse handling alternative use of by-products, I think it should be possible using system expansion, as it is the right way following the highest possible choice in the ISO Standard (step 1).		Expanding the system to include all the coproducts, and thus perform a facility level assessment is within the scope of these guidelines. However, the steering committee has expressly guided the TAG to exclude the consequential use of system expansion by substitution and to make the guidelines strictly attributional in character.
44	64		Paragraph 4	ge	Is it 'Step 3' or 'Stage 3'?		Stage 3. Revised.
45	66		Figure 9.1	ge	After step 3a1, I think it should be possible to use 'system expansion' for example, for use of co-product from slaughtering that substitute other products		Expanding the system to include all the coproducts, and thus perform a facility level assessment the scope of these guidelines. However, the steering committee has expressly guided the TAG to exclude the consequential use of system expansion by substitution and to make the guidelines strictly attributional in character. Table 9-1 outlines allocation procedures supported by the guidelines.
46	68	9.3.2	Paragraph 1	ge	Again, I think the definition of 'spent' and 'cull' sows is a bit confusing, especially that culled sows do not end as meat.		Again, this is the reason for clear definitions in the glossary.
47	78		Paragraph 1	te	'Error! Reference source not found'		Corrected.
48	80		Table 10.1	te	A line in the top of the Table is missing		Corrected.
49	82		Box 1	te	'Error! Reference source not found'		Corrected.
50	82	11.2	Paragraph 1	ge	'…calculating carbon footprint…' Eventually write that there is other impact categories as well, or that carbon footprint is an example		Added text: … as an example impact category, …
51	82		Box 1, paragraph 1	ge	Does the LEAP Animal Feed Guidelines also include 'grazing pigs' and pigs collecting feed themselves in outdoor systems, where they are a part of this system?		Grazing pigs are not discussed specifically in the Animal Feed Guidelines; however, some guidance is provided regarding grazing in general which should be applicable to pig production.
52	83	Figure 11.1 and 11.2		ge	Is it right with double title and figure numbers?		Figure 11-2 removed.

53	87	11.2.4.	Paragraph 4	ge	In text: Is it Equation 5 instead of 3?		Corrected
54	88	11.2.6	Paragraph 2	te	'Error! Reference source not found'		Corrected
55	89	11.2.6	Paragraph 1	te	'Error! Reference source not found'		Corrected
56	98	11.6	Paragraph 6	te	'Error! Reference source not found'		Corrected
57	99	11.9.1	Paragraph 1	te	'Error! Reference source not found'		Corrected
58	24 and elsewhere	2.1		ge	An overview comment is that it could be clearer throughout (and especially when first mentioned on page 24) about how the various Impact Categories are noted and what is covered in detail (i.e. Climate Change), in part (Water Consumption), or covered in a general sense (as noted in Table 8-2 and Figure 4-1), or noted as potentially relevant and with comment on them but not specifically noted in Table 8-2 and Figure 4-1 (i.e. Biodiversity)	In the first sentence of section 2.1, clarify the Impact Categories covered and their level of detail, i.e. that most focus is on climate change with general comment on the other 3 but with no methodology details	Adopted: Among the various Impact Categories common in LCA, this document covers Climate Change in detail, introduces Water Consumption, and provides a general overview or additional categories (as noted in Table 8 2 and Figure 4 1); Biodiversity is noted as potentially relevant and covered by the Biodiversity TAG guidance rather than this document.
59	29		Fig 4-1	ge	Eutrophication is marked as covered in LEAP Animal Feeds, whereas on page 24 it implies it is covered in these Guidelines	On page 24, omit Eutrophication from list of Impact Categories covered in these Guidelines	Section 8.5 indicates eutrophication should be included. Covered categories are consistently mentioned through the document. No change
60	29		Fig 4-1	ge	Water Consumption is not marked, indicating it is not covered, whereas on page 24 it is noted as being covered in these Guidelines, and there is moderate detail on it within the Guidelines, but it is not mentioned until page 93	In Figure 1, add green background to the Water consumption box	To be added by secretariat.
61	33		Par 5	ge	Pigs was not one of the early groups – it should be poultry	Replace the word 'pig' with 'poultry'	Corrected
62	44			ge	Use of 'arrow' is confusing, since the only arrow in Figure 6-5 is at the bottom of the boxes	Replace the word 'arrow' with 'box'	Accepted: 'rectangle' rather than 'box'
63	60		Table 8-2	ge	The row covering Water, should mention ISO14046 in the right column	The row covering Water, should include ISO14046 in the right column	Clarified
64	61	9.1		ge	This section should have comment about system expansion using system substitution is to be excluded – currently this does not appear until p63 and is not easily noticed	Add comment about system expansion using system substitution is to be excluded	Added.
65	63	9.2		ge	The comment on system expansion excluding system substitution should be repeated again later when describing Step 3	The comment on system expansion excluding system substitution should be repeated again later when describing Step 3	This does not seem to be a necessary place for this statement. No change
66	64		Par 3	te	Clarification could be given about what determines when 'physical allocation is not allowed	Clarification could be given about what determines when 'physical allocation is not allowed	Rephrased: "…not possible (infeasible computationally) …" and reference to 'allowed' removed.
67	65	9.3, 3rd line		ge	Should 'Table 4' be 'Table 9.1' ?	Replace 'Table 4' with 'Table 9.1'	Corrected
68	69	9.3.3, 2nd sentence		te	Here and again later on page 70 under "Residual' section: This should have a	Add "providing it can be identified that the manure is subsequently being used, such as for	An adapted caveat added at this location: This guidance recommends considering manure as a

					qualification that it is treated as a Residual, providing it can be identified that the manure is subsequently being used, such as for a fertilizer-substitute or energy source. Otherwise, it should be treated as a waste. Without this qualification, there is a risk that inefficient housed systems that dump or permanently stockpile manure just to get rid of it get away without the manure emissions being covered anywhere. This aspect is partly covered in the 2nd—to-last sentence of the next Waste section	a fertilizer-substitute or energy source. Otherwise, it is treated as a waste." at the end of this sentence	residual material, provided that the manure has a subsequent beneficial use such as fertilizer or energy source.
69	70		Par 2	te	At the end of the Residual section, add 'This applies where it can be proven that manure is subsequently being used, otherwise it is treated as a waste (see next section)'	At the end of the Residual section, add 'This applies where it can be proven that manure is subsequently being used, otherwise it is treated as a waste (see next section)'	Added: … and has a subsequent beneficial use (see next section on waste treatment)
70	70	9.3.4, 6th line		ge	Replace the word 'chicken' with 'pig'	Replace the word 'chicken' with 'pig'	Corrected
71	71		Table 9-1	te	In the bottom right cell of this table, refer to combining meat cuts into a product group before economic allocation	In the bottom right cell of this table, refer to combining meat cuts into a product group before economic allocation	Added.
72	73			ge	Omit "US"	Omit "US"	Corrected
73	87	11.2.4	Par 4	ge	Replace 'Equation 3' with 'Equation 5'	Replace 'Equation 3' with 'Equation 5'	Corrected.
74	93-97	11.3		te	After mention of 'Freshwater consumption', it should be defined and preferably a reference given. In this section in general, it should clarify what is included, i.e. is it water withdrawal or consumptive water use. If the latter, then comment is required about accepted approaches and a recommendation of accounting for a Water Stress Index (WSI). Assuming this is being recommended, then the Inventory methods should also comment about identifying the sites of the feed production and the farm so that a WSI can be determined.	After mention of 'Freshwater consumption', it should be defined and preferably a reference given. Clarify if this refers to consumptive water use. Assuming it is, add a sentence in this section about identifying the sites of the feed production and the farm so that a WSI can be determined.	Definition and reference added "Freshwater consumption i.e. direct water use leading to changes in fresh water availability for ecosystems (Milà I Canals et al. 2009) is an appropriate indicator of water use. Other indicators associated with nutrient load in water may also be included following ISO (2014)."
75		Appendix 2		ge	In the heading, replace 'large ruminant' with 'pig'	In the heading, replace 'large ruminant' with 'pig'	Corrected.
76				ge	There are numerous typographical errors and wording issues. I realize this is still in the draft stages, so I am not identifying all of these here (although I have marked them all in my copy), since I would assume this will go through some additional review and editing prior to publication, and most if not all of these will likely be corrected		The document has now been reviewed for typos and language issues - these have been corrected where they were found
77	Page v; 35, 36,	Forward, in page v;	Paragraph 2 in page v;	Te, ge	In the Forward, page v, in the second paragraph, fourth line, there is a reference to pig production in 'America'. It ('America') is also		Each instance clarified -

		and 6.1 in page 35;	paragraph 1, 4 and 5 in sector 6.1		used a few times elsewhere in the text (for example, it is used twice on page 36). It is not clear whether this is referring to the USA or whether it includes other countries of the Americas such as Canada. In my view, anytime reference is made to parts or all of the western hemisphere it should clearly state what countries are being referred to. I note the word 'Americas' is also used sometimes – at least in those cases, I would assume it is meant to include all of the western hemisphere.		
78	page v	Forward	Paragraph 2; The 10th – 12th lines	Ge, te	Still in the Forward on page v, in the second paragraph, in the 10th – 12th lines, it states in essence that increasing pig production would be of 'particular concern since the livestock sector already has a major impact on natural resources.' But as I understand it, much of this is related to ruminants. I don't think a broad statement such as this is necessary when, for example, (as stated in the next line) pigs are only about 9% of the livestock sector's contribution to GHGs.		Not accepted. While it is true that pig systems only contribute around 9% of the livestock sectors GHGs. For other important impact categories such as eutrophication potential, acidification potential and non-renewable resource use the impacts caused by pig production are at similar levels to those of ruminant production systems (de Vries and de Boer, 2010; Williams et al., 2006). The statistics cited regarding cropland and green water use in pig production justify the statement included here.
79	Page x to xxii	Acronyms and Glossary		ge	Under the 'Acronyms and Glossary' section, there are definitions from page x to xxii, under three different categories. I found this confusing and time consuming when I was trying to find various definitions, since I would have to look under all three categories to look for a definition. I think they could all be under one section in alphabetical order.		Acronyms merged with Abbreviations. the TAG views this categorization of definitions as preferable to one long list; We have adopted the glossary structure of the other documents.
80	Page xi	Acronyms and Glossary		ge	On Page xi, under the 'Acronyms and Glossary' section, "Terms relating to feed and food supply chains', the terms 'Conserved forage' and 'Crop residue' on page xi are out of order.		Accept. 'Conserved forage' and 'Crop residue' were moved to the correct order.
81	23, 24	2.1	Paragraph 1	ge	Under Section 2, Scope, on page 24 (and by the way, it seems odd to jump from page xxii to page 23), it states that the guidelines cover only '…climate change, water use, eutrophication and fossil energy use'. These of course are all negative impacts. It is somewhat disappointing that the positives of pig manure nutrients and associated benefits do not appear to be covered. Pig manure should not be viewed only as a negative waste material since it reduces the need for synthetic non-renewable fertilizers, provides valuable fertilizer for crops and helps to build soil. And when talking about the use of land and resources for the growing of feed		Accept. Same response to **comment 15**, page number was corrected. The TAG agrees with the reviewer that potential positive benefits should be highlighted in studies following these guidelines. In fact, the option, when applicable, to consider manure as a co-product provides exactly this opportunity to show lessened impacts of livestock products by assigning some of the upstream burdens to the manure. Within the guidelines set out here there are only a few very specific circumstances that pig manure is

					grains, there should be appropriate consideration of the fact that much of the livestock sector (including pigs) use grains, other crops and other feed that for several reasons are not particularly suitable for human consumption. In other words, if much of this feed were not used for animals, it might simply go to waste since they are often not consumable by humans - this is an important point that should not be lost.		viewed as a waste material. This is made explicit see section 9.3.3 subheading waste, manure is not considered a waste material in most circumstances according to these guidelines The argument that manure replaces inorganic fertilizers is true at small scale; however, a large fraction of the N in the manure was originally fixed by the Haber Bosch process – what is important is not that it is replacing inorganic fertilizers, but that the nutrients are recycled efficiently – these benefits are being defined by the Nutrient TAG. Using marginal grains as livestock feed is indeed a beneficial use of those materials. The Feed TAG guidelines should be referred to for quantifying the benefits associated with these materials – if they are by products, then the allocation procedures for feeds will show lower impacts and the animals produced from these ingredients will likewise show improved performance compared to animals feed the main products.
82	26	Figure		ge	The diagram at the top of page 26 does not appear to be labeled or referred to in the text.		Accept. See response to **comment 25**
83	35	6.1	2nd paragraph, third line	ge	Under Section 6.1, Pig Production Systems, Background, page 35, second paragraph, third line, the term 'back yard systems' is used. The term is used a few times in the document and while at one point later in the document (page 40), it is defined in the text, it should perhaps be defined in the Glossary. Other similar terms are used such as 'scavenging', 'intensive small scale', 'extensive system', etc, and they are defined.		Accept. The definition of 'Backyard system' was added in the Glossary.
84	35; 46; 74	6.1	second paragraph, fourth line on page 35; First paragraph on page 46; The fourth paragraph on page 74	ge	Also under Section 6.1, Pig Production Systems, Background, page 35, second paragraph, fourth line, the term 'semi-industrial' is used when referring to pig operations. The term 'industrial' is also used in Figure 6.1 on page 36. And I believe it is used a couple of other times in the document (page 46, for example). In my opinion 'industrial' is a somewhat pejorative word, especially when the paper is already using the term 'intensive' and 'large (scale) intensive' (and defines it). The paper should use the word 'intensive' and not 'industrial'.		Accept. "industrial" was replaced by "intensive" in the appropriate places
85	37-38	Figures		ge	The maps on page 38 appear to be reversed in order. Also, there does not appear to be any explanation or discussion of the maps in the		Figures have been renumbered sequentially.

					text. In the map in Figure 6.3, the term 'Intermediate Systems' is used - this is not defined and does not appear to be used anywhere else, except in Figure 6.1. This term should be defined if it is going to be used, and/or it should be discussed in the text.		Discussion of intermediate (medium) systems has been added.
86	39	6.2.2	fourth paragraph, first line	ge	On page 39, under Section 6.2.2, Extensive Systems, fourth paragraph, first line, the term 'high quality' is used. This seems to be a subjective term.		The term high quality removed from this sentence which has been revised to "The animals are used to produce hams and sausages which attract a price premium, such as acorn fed Iberian ham (Jamon Ibérico de bellota), with high index of oleic acid is well known in the market."
87	39	6.2.2	fifth paragraph	te	Also on page 39, under Section 6.2.2, Extensive Systems, fifth paragraph, there is a rare mention of possible positive environmental impacts of (extensive) pig systems. This however also appears subjective.		The TAG agrees; what is the recommendation?
88	42	6.2.5	4th paragraph	ge	Under Section 6.2.5, Intensive (Large Scale) Systems, continuation of the 4th paragraph at the top of page 42, the abbreviation 'MMS' is used. This should be stated in the Abbreviations section at the front of the document.		Accept. Added "MMS" in the Abbreviations section.
89	44	6.4	first paragraph	Ge, te	Under Section 6.4 Overview of Global GHG Emissions from Pigs section, page 44, first paragraph. The global GHG emissions rate is given for all livestock (14.5%), but not for pigs – which is only 1.3%. It also states that 'While their emissions are comparatively low, the sector's scale and rate of growth means that reductions in emission intensity should be targeted.' This brings to mind a couple of comments/questions. Firstly, the sector's scale - how big it is compared to other livestock should be stated. And secondly, is the pig sector expected to grow faster than the other livestock sectors?		Relevant sentence added "The pig sector accounted for around 37% of global meat production in 2010, with global demand for pig meat projected to rise 32% 2005-2030 (Macleod et al., 2013)" The purpose of this overview is to document the importance of the pig sector, not to contrast against other sectors.
90	46		Figure 6.7	ge	Some of the abbreviations used in Figure 6.7 on page 46 are not clear, such as, 'LAC', 'SSA' and 'NENA'.		Accept. Added 'LAC', 'SSA' and 'NENA' in the Abbreviations section.
91	47		Figure 6.7	ge	The Macleod, et al, reference at the bottom of page 47 appears misplaced.		Accept. Figure sources were moved to the bottom of each figure.
92	49	7.2	Paragraph 1, 4th and 6th line;	ge	Starting on page 49 and stated a number of times throughout, the term 'cradle' (as in, 'cradle-to-animal's-mouth', 'cradle-to-farm-gate', 'cradle-to-primary-processing gate', among others) is used. Perhaps this should be defined.		A clarifying addition made in the definition on page xviii

93	51	8.3 on page 51; 9.3.3 on page 69	third paragraph, first line on page 51; 2nd paragraph in 9.3.3 sector on page 69	ge	On page 51, under Section 8.3, Functional Units/Reference Flows, third paragraph, first line, there is reference to a 'Table 2'. Is that table 8.1 on the next page? There is also a reference to 'Table 2' on page 69, third line under 'Co-product'.		Table were re-numbered and were checked and text references updated.
94	70	9.3.4	Line 6 and line 10 in paragraph 1	ge	On page 70, under Section 9.3.4, Multifunctional Manufacturing Facilities, there are three cases using chickens and feathers as examples. Since this is a pig document, this appears to be an error.		Accept. 'Chicken' was changed to 'pig', and 'feather meals' was deleted.
95	72		Line 2 in the box	Ge, Te	On page 72, in a boxed-in area, shown as an Example Calculation for on Farm Energy Generation, it states 'One such technology which holds high promise is well developed is anaerobic digestion'. Besides the grammatical error, this statement seems somewhat subjective. AD is a highly sophisticated technology which is very expensive and not suitable to all areas. Significant public subsidization is usually required to set up and maintain such systems, along with high concentrations of supply to feed into them. They are also very difficult to operate in colder climates.		Accept. Grammatical error corrected and qualification ow given: "Anaerobic digestion is one such technology which holds high promise in some areas and is well developed"
96	73	Box	Title	Ge	On page 73, the boxed-in area titled: 'Example: Effect of Mass and Economic Value of Different Components of an Average US Market Hog Leaving an Abattoir on Allocation Calculations', There is a reference in the second line to an '…average abattoir in China…', which I assume is supposed to say in '…average abattoir in the USA…'?		Accept. The word "US" in the title was deleted.
97	73-77	10.2.1	The last paragraph of page 76 and top of page 77	Te	The last paragraph of page 76 and top of page 77 appears to be repeating information given on page 44.		It is correct that there is some repetition in these two sections, however they refer to the same information in a different context initially as a background to global environmental impacts of pig production and later in terms of measurements required to focus on the hotspots. In a document as long as this one the TAG prefer to leave the information given in both sections
98	82	11.1	7th line in paragraph 1	Ge	The 7th line of the first paragraph on page 82, refers to a 'Figure 2 in Chapter 8'. Not sure if that is a reference to Figure 8.2?		Figures renumbered sequentially.

99	82	Box 1		Ge	The boxed-in area on page 82 is called 'Box 1', but there are two other earlier boxed-in areas on pages 72-3.		BOX numbering corrected
100	83		Figure 11-1	Ge, Te	The diagram at the bottom of page 83 has two titles.		Corrected.
101	93	11.3.1	Paragraph 1	Te	Under Section 11.3.1 'Water Supply Balance', page 93, in the discussion on evaporation, there does not appear to be a mention of the effects of precipitation which can, to some degree, counteract evaporation in open manure storage systems.		Accept. Sentence on precipitation "The methodology mentioned (pan evaporation) accounts for precipitation amongst other factors which affect evaporation. This is now made clear with added text "Pan evaporation is one way of estimating evaporation which accounts for several climate elements including temperature, humidity and rain fall." was added in revised documents.
102	97	11.5	Paragraph 1	Ge	On page 97, under Section 11.5, 'Piggery Manure Management Water Balance', in the first paragraph, second line, there is a reference to 'manure and urine'. Urine is normally considered to be a part of manure. This should probably read 'feces and urine'.		Accept. 'manure and urine' was changed to 'feces and urine'
110	XV		Terms relating to pig supply chains	te	Definition Feed quality: (energy, *amino acids*, crude protein…)	Information should be changed to "amino acid composition".	Accept suggestion
111	2	2	2.1	ge/te	This statement is confusing. To make pig supply chains more sustainable, means to improve environmental performance.	The sentence should be precised. The social dimension of sustainability is not covered by the document, but improved environmental performance should be in the scope.	Additional clarification added to this section
112	9-10	4	4.5	te	General structure of the sub-chapter: 5 guiding principles are announced, but according to the structure (italic headings) 9 principles could be identified	Adaption of the text (either extension of the number of principles or re-shaping of the list!)	Accept Suggestion – nine principles
113	11	5		te		This statement is in contradiction to the position in the introduction (see comment for page 2 above). Thus, the introduction must be adopted accordingly!	We disagree that there is a contradiction. In both places it is stated that the guidelines are for environmental performance. It is not a contradiction to qualify it as not being comprehensive on page 2 and to state that it is a goal in this section
114	18			te	Typo: If manure is stored in a liquid, anaerobic system the*n* methane emissions may be high.	If manure is stored in a liquid, anaerobic system the methane emissions may be high.	Rephrased for clarity
115	26	7		te	Eutrophication!	Eutrophication was also indicated in the introduction to be one of the important impact categories!! It should be mentioned, that this impact category is properly reflected in the LEAP Feed Guidelines	Impact category coverage clarified and made consistent throughout the guidelines, including reference to the Feed Guidelines.

116	34	8	8.5	te / ge	Eutrophication!	In that chapter, eutrophication is again within the scope, not mentioning, that it should be managed according to the LEAP Feed Guidelines, as indicated before in chapter 7!	Impact category coverage clarified and made consistent throughout the guidelines, including reference to the Feed Guidelines.
117	45	9	9.3.1	te / ge	Feed consumption!	It is a senseful approach to base the total calculation on the feed intake. But to cover that properly, feed conversion should be considered as well. Due to the different types of feed or even different feed consumption of the different animal species using the same feed, should be considered. Thus, the input/output balance on the farm is the only applicable approach. (I guess, the authors want to say that, but it is described slightly differently and can be misunderstood!).	No change to text: The reviewer is, of course, correct that feed conversion ratio depends on the factors mentioned. However, it is not fully clear that feed conversion is needed to determine feed intake. Many of the feed intake models for livestock are derived from metabolizable energy requirements, which does not require knowledge of feed conversion. Nevertheless, biophysical modeling of the animal should include the conversion so that manure production can be estimated presumably the livestock production numbers will be known because the animals are weighed prior to sale. Thus, with feed intake and live weight sales the feed conversion ratio can be inferred
118	60	11	11.2	te	Amino acid	As commented before, the wording should be changed to “amino acid composition” instead of "amino acid" (see comment to page XV)	Accept recommendation
119	81	12	12.4	te	However they can be used to identify hotspots in the cradle-to-primary-processing-stages (which are the major contributors to emissions across the whole life cycle) and assess potential GHG reduction strategies…..	The proposed text should be continued as follows: .....downstream the pig supply chain which can enable improved animal performance.	Reject recommendation. It is of course true that improved animal performance is important; however, by adding it here it seems to suggest that is the main or only avenue for improvement.
120	81	12	12.5	te	Elements of the report!	As a fourth bullet point the discussion on potential mitigation options should be included as well. If this point will not be covered, an important momentum of the whole work would not be considered!	Accept recommendation – prefer to add to the interpretation bullet
121	82	12	12.6	ge	Feed intake and feed conversion!	With the feed intake also feed conversion ratio as a farm input-output balance need to be considered. This actually< not yet included in the LEAP Feed Guidelines but can be further considered in the TAGs on nutrients and feed additives.	Recommendation not clear. LCA should always be based on balanced systems. Feed conversion, too, is automatically considered when the feed consumed and products produced are known – it is not necessary to calculate or report conversion ratio in order to perform the LCA – it is very useful in interpretation and comparison, and the TAG recommendation is not intended to indicate it is not an important parameter, simply that its calculation is not required by the guidelines.
122				Reference	Reference A 1.16 Matlock et. al., unknown	This is not the correct citation!	Citation removed.

124	2 - 3	2		ge	Regarding scope and application LCA has great value that enables defining strategies to reduce / minimize environmental impacts in the system boundary. A key factor – in my mind – that could influence the (public) perception of pig production systems is the fact that it is a partial assessment focussing on a limited set of environmental impact indicators. Of course, this is indicated in the 'Scope' section, but despite this I would be in favour of a somewhat broader consideration of which (social, environmental and economic) impact indicators are 'missing', and that selection of key performance indicators is a crucial step in determining the 'sustainable' performance of a certain system.	The section 2 could be extended (e.g. one paragraph) to focus on what type of impacts could also be considered. There is sufficient literature on sustainability, and sustainability indicators available to refer to.	The TAG agrees that there is sufficient literature on this topic, and feels that the limitations expressed in this section are sufficient; a statement indicating the broader nature of full sustainability assessment is included.
125				ge	Another element of relevance, which in my mind might be insightful for practitioners is to describe the value of this guidebook for assessing the effect of certain mitigation measures / technologies. Any mitigation technology implemented can both have a positive or negative effect on an impact indicator. Anaerobic digestion for example can reduce the CH4 emissions from manure storage. However, introducing a given technology / measure that addresses 'only' one single pollutant could cause an increase of another pollutant somewhere else in the relevant system. Conceptual awareness such 'co-benefits' and 'trade-offs' could – in my mind – be helpful for practitioners to be better able to assess the 'effectiveness' of a certain mitigation measure.	Consider including a paragraph in Ch. 2 that also briefly discusses the potential co-benefits and trade-offs of certain mitigation measures (perhaps include some simple examples to illustrate the concept). This discussion would fit in the general discussion regarding promoting Green Growth, where the aim is to mainstream (or integrate) climate policies with existing social, economic, development and environmental policies.	Following text added. In view of the limited number of environmental impact categories covered here, results should be presented in conjunction with other environmental metrics to understand the wider environmental implications, positive or negative. It is also relevant to note that either synergies or trade-offs between different impact categories may arise and acknowledging and reporting these is important. It should be noted that comparisons between final products should only be based on full life-cycle assessment. Users of these guidelines shall not utilize results to claim that some pig production systems and products are environmentally superior.
127	46	9.3.3		te	I believe that digested energy will be used for maintenance, growth, or production of milk etc. Biomass that cannot be digested ends up in manure.	Change proposed methodology to use energy requirement for producing manure. If the economic value of manure is for the production of energy, a biophysical allocation could be the share of energy content in the products? If the manure is sold as fertilizer, it could be nutrient content?	The reviewer is correct regarding the function of digestion, still the TAG rejects the suggestion. The guidelines attempt to be strictly attributional, and thus apply the same approach for allocation to activities at the same stage of the supply chain. Thus, the energy allocation approach is the method adopted. In fact, the equations proposed result in an allocation essentially equivalent to the energy content of the manure
128	46	9.3.3		te	The paragraph makes it clear that finally economic allocation is the method of choice because biophysical allocation is not easy (see	Change text 'as the functions are different for the product (fertilizer vs energy for manure). … What is meant here? Meat and other products	If the feed ration is known, then biophysical allocation as recommended is not difficult, and in

					also above) and the co-products serve different markets. However, the text is not easy to understand.	vs manure, so which two markets are served? Do you mean 'food vs fertilizer or energy for manure'?	this case, the use of the material in different markets is not a factor. The reviewer is correct, the example was wrong and has been corrected.
129	47	9.3.3		te	Inconsistency … is this a problem? First, allocate emissions between 'wealth' and other. Then, allocate 'manure' and 'other co-products' by economic allocation….	Maybe a cluster analysis needs to be proposed so that allocation is not done in one go but sequentially depending on the 'distance' of the markets. That might be integrated into Table 9-1 but possible also needs another flow-diagram explaining the concept.	This is an interesting avenue. Without some additional suggestion regarding the proposed distance metric, it is not possible to incorporate into the guidance at present. The guide currently assigns the 'distance' to wealth management, when relevant, as the shortest – thus it is done first.
130	47			te	Guidance is required what 'excess of crop nutrient requirements' exactly means. Is it everything that is more than crop uptake? Or is the farmer a luxury application allowed as there is no zero-loss system? Or is it the amount of nutrients at the economic (or ecological) optimum?	Provide additional guidance	At present, we will leave further guidance to the Nutrient TAG's upcoming guidance document
132				ge	The OIE congratulates the TAG on a comprehensive and scientifically sound piece of work. The commission that reviewed the document has not come across any issues that are likely to affect the perceived or actual, positive or negative effects of animal health (and welfare) measures or practices on the three main impact categories covered in the guidelines: climate change, land occupation and fossil fuel demand.		thank you
133	47	9.3.4	1	Reference	"…path 3b in Figure 12)…"	"…path 3b in Figure **9.1**)…"	Corrected
158	82	Boxed-in area		ge	The boxed-in area called 'Box 1', but there are two other earlier boxed-in areas on pages 72-3.		fixed
162	24	2.1		te	What is the reason for not including acidification in the guidelines of pig supply chains?	Please provide at least the reasoning.	It is primarily associated with the evolution of the guidelines and the timeframe of production during which the experts are available. The first guides included only GHGs, and later guides have added more categories as supported by the TAG. It is not excluded as an indication of unimportance.
163	25	3.1		ge	Error in Reference		Corrected
164	26	3.1	Figure	ge	Figure caption is missing. Poor Figure quality.	Add Figure caption and improve image quality.	Corrected

165	27	4.1		ge	"analyse" written in British spelling; no consistent use of American spelling in the document (but I'm not native)	Check and maybe change in the whole document.	Corrected
166	28	4.2	First paragraph	ge	Sentence repeated twice	Delete one sentence.	Corrected
167	29	4.3	Fig. 4-1	te	Impact categories marked as being covered in these guidelines are not in-line with those mentioned in Chapter 2.1.	Check and adapt marks in Figure 4-1.	Corrected
168	29	4.4		ge	Space missing: ISO 14040:2006in the development	Add space.	Corrected
169	30	4.4	First paragraph	ge	Break missing.	Add break.	Corrected
170	31	4.5		ge	*Life cycle perspective & Relative approach and functional unit:* change of font in these paragraphs. Maybe quotation marks are just missing in the second one?!	Adapt layout.	Corrected
171	34-35	5.2		ge	Is it necessary to provide so many details of the preparation? Not relevant from the users perspective.	Check.	Unclear what the recommendation is in this case.
172	35	5.3		ge	What does periodically mean?	Specify.	The timing has not yet been determined
173	39	6.2.2	Second paragraph	ge	2nd sentence: delete 'In'		Corrected
174	39	6.2.2		ge	Is it really necessary to provide so many details on extensive systems, esp. Iberian pigs? What is the benefit for users?		This structure follows the other sector TAGs. It is provided for context and background. Users can skip the first section of the document and begin directly with the more practical LCA presentation.
175	42	6.3		ge	Growing to finishing (d): It might be good to also include an average range of market weights, as done in b + c.		
176	43	6.3	Figure 6-5	ge	Figure 6-5 is of poor quality and, even with the descriptions in text, hard to understand in detail. Figure and corresponding text are too confusing.	Prepare a new Figure with revised layout.	Clarified discussion has been added.
177	38	6.2	Figures 6-3, 6-4	ge	Shown in reverse order.		Corrected
178	47	6.5		ge	Reference placed in the middle of the page	Move reference to footnote or to list of references	Corrected
179	53	8.4.1		ge	Error in Reference		Corrected

180	55	8.4.1	First paragraph	ge	Error in Reference		Corrected
181	56	8.4.3	First paragraph	ge	Repetition of 'percent' in lines 3-4.		Corrected
182	57	8.5	First paragraph	ge	2 errors in Reference		Corrected
183	62	9.2		te	Economic allocation: Market prices vary considerably over time, which possibly bias the allocation shares.	It might be recommended to use average market prices over a defined period of time, e.g. 3- or 5-years average.	Mentioned in Table 3.
184	62-65	9.2		ge	Chapter 9.2 is hard to follow and difficult to understand.	Paragraph should be improved / rewritten.	Without specific suggestions or critique of what is difficult to understand, it is hard to improve.
185	62	9.2	First paragraph	ge	In the first paragraph, it is referred to Figure 13. Should it be referred to Figure 9-1? Please check and adjust.		All figures re-numbered.
186	65	9.3		ge	It is referred to Table 4, which doesn't exist. Please change.		Tables also renumbered.
187	67-68	9.3.1		te	Is there any reference for this approach of biophysical allocation in pig / livestock production? However, I agree with your argumentation.		Thoma, G. J., Jolliet, O., & Wang, Y. (2013). A biophysical approach to allocation of life cycle environmental burdens for fluid milk supply chain analysis. International Dairy Journal, 31(1), S41–S49. https://doi.org/10.1016/j.idairyj.2012.08.012
188	70	9.3.4	Line 2	ge	Repetition. Delete 'then'		Corrected
189	70	9.3.4	Last line	ge	The example mentioned should follow directly after this paragraph or should otherwise be clearly marked or numbered as such. It is just stated 'below'. The heading of the example itself is talking about 'US hogs', whereas the sub-heading includes Chinese pigs. This is confusing.		Corrected.
190	78	10.2.2	First bullet	ge	Error in Reference		Corrected
191	79	10.3.1		ge	Repetition of bullet points listed in 10.1, page 75.	Bring together both paragraphs or alternatively refer to each other.	Attempted to clarify.
192	83	11.2	Fig. 11-1 Fig. 11-2	ge	Captions of Figures 11-1 and 11-2 are both placed at the same figure on page 83.	Separate or specify difference in both figures. Note is not sufficient.	Corrected
193	103	12.2.3		te	Normalization should be handled very carefully in LCA analyses.	Clarify further when and how users should/could make use of normalization.	The intent is to let users know of the availability; while specific guidance on when it should be used is not presented, the context of identifying relatively larger contributions is discussed.

194	107	13		ge	Some references are missing sources (e.g. Cederberg and Flysjö 2004, Gerber et al. 2013)		Corrected