

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response	
	1	wilfart	??					For the definition of “Silage”: insert a comma after “contents”	Done	
	2	launois	28	1000	4.3.1	Figure 5	Ge	The figure’s title suggests that the diagram presented here is a generalised system diagram. But the diagram mentions neither input to soil nor organic material in soil.	Deleting “Generalized system” in the title of Figure 5.	Revised by omitting "system"
	3	wilfart		1002				change “the redistribution of excreta nutrients in the landscape is largely from” to “excreted nutrients are largely redistributed in the landscape by”	Done	
	4	wilfart		1005				change “are dependent” to “depend” and “The accuracy of animal population estimates is” to “Accurate estimates of animal populations are”	Done	
	5	wilfart		1007				change “animal feeding operations” to “animal-feeding operation’s”	Done	
	6	wilfart		1011				change “bedding materials imported” to “imported bedding materials”	Done	
	7	wilfart		1013				insert “the” before “livestock”	Done	
	8	wilfart		1014				change “Where” to “When”	Done	
	9	grant	v	102			ge	wording	Delete “and to develop”	Done. Thank you

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	10	grant	29	1020-1026			Use of global data bases should be used with caution with forage-based diets fed in confinement as forage quality can be highly variable based on forage type, time of cutting etc., as has been stated in L 1027-1029 with regards to nutrient concentrations of forage-based diets for grazing.		Agree - but wording already implies this - so no need for a change
	11	grant	128	1021		Ge	Punctuation	Each day , animals	Done
	12	wilfart		1021				change "content" to "contents"	Done
	13	vadas	128	1026	Appendix 8	technical	The APLE model is a quantitative P index that could be an excellent option here. Information is provided at the website referenced.	https://www.ars.usda.gov/midwest-area/madison-wi/us-dairy-forage-research-center/docs/ape-homepage/	Done. Added this reference
	14	wilfart		1031				change "Where" to "When"	Done
	15	grant	29	1032		Ge	Wording	Delete "for forages"	done
	16	wilfart		1032				change "for at least" to "on at least"	Done
	17	wilfart		1034				change "Where" to "When"	Done
	18	wilfart		104				change "last" to "last few"	Done
	19	wilfart		104				suggest changing "livestock product demand" to "demand for livestock products"	Done
	20	wilfart		1056				insert "are" after "losses"	Done
	21	wilfart		1057				put "e.g. from uncovered yards and housing" in parentheses	Done

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22	grant	v	106			Ge	Current wording attributes sole blame to livestock!	Replace "into the environment are responsible for" with "contribute to"	Done. Thank you
23	grant	30	1063				Include reference to the nutrient composition of the gravid uterus in breeding animals, similar to the concept of accounting for gut fill.		Reject. The gut fill is considered in manure excretion, whereas, the weight of the foetus is already considered in the live-weight of pregnant animals.
24	wilfart		1065					change "live weight correction" to "LWC", to use the acronym that you defined	Done
25	wilfart		1066					change "live weight" to "LW", to use the acronym that you defined	Done
26	wilfart		1067					put "e.g. an individual farm or for the region or country based on available production statistics" in parentheses	Done
27	Lathuillière	31	1069	4.3.3.1		te	Empty body weight	This term seems quite important but undefined in the glossary. I'm also unsure how it may be related to "carcass weight" which is defined in the glossary. Please define this term in the glossary	Changed to account for this
28	wilfart		1069					insert "(EBW)" after "empty body weight" (to define the acronym used later) and change "live weight" to "LW"	Done
29	wilfart		1070					change "live weight" to "LW" and "empty body weight" to "EBW"	Done
30	wilfart		1076					change "to" to "on"	Done
31	wilfart		1087					change "live weight" to "LW"	Done

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32	wilfart		1088					change "empty body weight" to "EBW"	Done
33	Lathuillière	31	1096	4.3.3.2	Equ. 8	te	Units in the equation	For clarity please confirm and add the following units for: NUTRAP = kg nutrient/unit of time AP = kg of animal product /unit of time	Accept proposed changes
34	Lathuillière	32	1100	4.3.3.2		te	"should"	There are two "should" recommendations. It seems that in the case of secondary data, a "shall" recommendation might be more appropriate, in the case of missing primary data.	Accept. ...secondary data shall be.....
35	wilfart		1104					change "tier" to "Tier"	Done
36	wilfart		1110					change "between 50% to 90%" to "50-90%"	Done
37	wilfart	32	1116		Equation 9	ge	The inclusion of what appear to be standard deviations in Equation 9 make it more difficult to understand. I suggest moving them to a sentence outside the equation.		Accept. We will remove the two bracketed parts in Equation 9
38	wilfart		1118					change "proportion" to "percentage", since Equation 9 gives a percentage, not a proportion	Done
39	grant	32	1122				Wording	Delete "the"	Accepted
40	wilfart		1123					change "into" to "in"	Done

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41	wilfart		1124					suggest changing "harvested" to "collected", for consistency with the previous sentence and to avoid confusion with "harvesting crops"	Done
42	wilfart		1126					change "Feeding for many pigs and poultry systems occur" to "Pigs and poultry in many systems are fed"	Done
43	wilfart		1143					change "amount" to "amounts"	Done
44	wilfart	33	1158	4.3.3.4	paragraph	ge	The EMEP/EEA Air Pollutant Emission Inventory Guidebook (2016) is called "EEA (2016)" in the rest of the text (cf. line 1177); please use a consistent term to describe it throughout the document.		Accept proposed change. We will use EEA (2016) throughout
45	wilfart		1159					change "where" to "when"	Done
46	wilfart		1162					change "The country specific" to "Country-specific"	Done
47	grant	34	1163-1165				capitalization	See comment for p. 18, line 709 Also delete " after Emissions"	Done
48	wilfart		1165					the quotation mark in this line does not have a partner (another quotation mark)	Done
49	wilfart		1171					change "tier" to "Tier" and "manure management system" to "MMS"	Done
50	wilfart		1172					change "Emission factors" to "EFs"	Done

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51	wilfart		1176					change "emission factors" to "EFs"	Done
52	Lathuillière	34	1178-1180	4.3.3.4.1	Houses	te	"can be adequately" "can be calculated"	It seems that these might be "may" recommendations	Accept
53	wilfart		1180					change "emission factor" to "EF"	Done
54	wilfart		1183					change "tier" to "Tier"	Done
55	wilfart	34	1183-1185	4.3.3.4.1	paragraph	ge	Please refer to references or publications that give an ammonia emission factor for manure and one for urine.		At end of line 1185, we added "(e.g. Kelliher et al. 2014)" and add in references - Kelliher FM, Cox N, van der Weerden TJ, de Klein CAM, Luo J, Cameron KC, Di HJ, Giltrap D and Rys G 2014 Statistical analysis of nitrous oxide emission factors from pastoral agriculture field trials conducted in New Zealand. Environmental Pollution 186: 63-66.
56	wilfart		1184					change "where" to "when"	Done
57	wilfart		1188					change "manure management system" to "MMS"	Done
58	grant	34	1189				Wording	<u>anN2O...</u>	Done
59	wilfart		1189					insert "an" before "N2O"	Done
60	wilfart		1190					change "emission factors" to "EFs"	Done
61	wilfart		1193					change "the solution" to "dissolved" (or "solute")	Done

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62	vadas	35	1199	4.3.3.5		technical	Consider work by Vadas to easily estimate erosion and P loss from outdoor cattle lots. I also include a reference where we estimated P loss from all areas on grazing farms, including cattle lots, pastures, and cropped fields.	Vadas, P.A., L.W. Good, J.C. Panuska, D.L. Busch, and R.A. Larson. 2015. A new model for phosphorus loss in runoff from cattle barnyards and feedlots. Trans. ASABE. 58:1035-1045. Vadas, P.A, J.M. Powell, G.E. Brink, D.L. Busch, and L.W. Good. 2015. Modeling whole-farm phosphorus loss from grazing-based dairy farms. Agricultural Systems. 140:40-47.	Done. At end of line 119, added - "P loss in runoff from cattle yards and feedlots can be estimated using Vadas et al. (2015)." Then in the reference list added - Vadas, P.A., L.W. Good, J.C. Panuska, D.L. Busch, and R.A. Larson. 2015. A new model for phosphorus loss in runoff from cattle barnyards and feedlots. Trans. ASABE. 58:1035-1045.
63	wilfart		1201					change "underlying soil compaction and the bonding of" to "compacting underlying soil and bonding"	Done
64	wilfart		1202					change "Where" to "When" and "they" to "the flows"	Done
65	wilfart		1208					insert a comma after "systems"	Done
66	grant	35	1209			Text	Confusing	Based on the definitions provide in the Glossary (page xxv) it seems strange that a more complex Tier 2 approach is recommended when the methodology isn't available to perform a simpler Tier 1 analysis. It seems very counterintuitive to me.	Done
67	wilfart		1211					insert a comma after "6"	Done
68	wilfart	35	1211	4.3.3.5	paragraph	Text	Appendix 6	Appendix 8	Done

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69	wilfart		1213					insert a hyphen between “water” and “soluble”, change “tier” to “Tier”, and change “where” to “when”	Done
70	wilfart		1214					change “is” to “are”	Done
71	wilfart		1218					change “tier” to “Tier”	Done
72	wilfart		1221					change “tier” to “Tier”	Done
73	wilfart		1222					change “climatic” to “climate”	Done
74	vadas	36	1229	4.3.3.6	Equation 10	general	Indicate that the cover reduction factor is for dung cover. As this is for pastures, readers might think this has to do with vegetative cover.	In line 1234, say ‘... cattle is corrected by an annual dung cover reduction factor:’	Corrected as indicated
75	wilfart		1229					change “*” to “x” for consistency with the previous equations	Done
76	wilfart		1233					change “doesn’t” to “does not” (for scientific writing) and insert a comma after “surface”	Done
77	grant	36	1235				Define cover reduction factor.		Clarified in point above so no need for additional changes
78	grant	36	1235			Te	Citation needed	This equation needs to be cited – is this the best one?	It is linked to equation 10 which was referenced and it relates to the same work - so no need for change
79	wilfart		1235					change “x” to “x” for consistency with the previous equations	Done

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80	vadas	36	1237	4.3.3.6	Equation 11	general	Indicate that annual dung cover is expressed as a decimal with a maximum of 1.	Begin line 1237 with , "where annual dung cover is expressed as a decimal with a maximum of 1.0, and is calculated assuming each 250 g (dry weight basis) of excreted cattle dung covers 659 cm ² .	Done
81	wilfart		1237					insert a comma after "runoff"	Done
82	wilfart		1239					this line uses "P index framework", while the previous line used "P Index system"; suggest using the same term here and there	Done
83	wilfart		124					suggest changing the beginning of the sentence to "The guidelines developed by the LEAP Partnership gain strength because they represent..."	Done
84	wilfart		1244					change "where" to "when", insert a comma after "available", and change "P Index method" to the same term used in lines 1238 and 1239	Done

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85	grant	37	1247				Use of a P index (Sharpley 2003) requires precautions to ensure that the index, just like any other model, is locally calibrated and validated. For example, Sharpley and his colleagues have recently demonstrated that P indices that are not calibrated and validated can often provide inconsistent estimates of P loss, when they are employed in the same watershed (Osmond et al. 2017).		Adjusted as recommended

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86	herman sen	36	1248- 1297	4.3.4.		tech	<p>First, it is not clear under what circumstances it will be needed to allocate in relation to estimating nutrient flows. Next, biophysical allocations (as recommended) seems inappropriate in this case, where the topic is nutrients and not carbon.</p> <p>The alternative is economic allocation, which is described in more details in appendix 7. However, from a nutrients perspective it seems much more appropriate to consider directly the nutrients from other sources which manure can substitute. This also seem more aligned with the NUE concept as described later.</p> <p>In the PEF for Red Meat, the next column has been proposed. The intension is also meant for sharing GHG burdens, but in relation to nutrient accountancy and efficiency, this procedure seems even more appropriate and can be adapted to only include nutrients. .</p>	<p><u>Manure is a co-product from the live animal production. Manure produced by animals can be applied as natural fertilizer in relation to feed production for the livestock production in question at the farm, for other crops at the farm or for other crops by a third party. If manure is applied on land used for feed production within the farm, impacts related to manure use are included in the feed production at the farm and thus taken into account in relation to the environmental impact of feed used. Thus, the fact that manure fully or partly substitute synthetic fertilizer that otherwise would be needed for that production are automatically accounted for in the assessment If manure is applied in other cases, it is considered as a co-product and is handled according to the Commission Recommendation of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations: Handling of multifunctional processes section 5.10. Here it is stated that if a direct substitution-effect can be robustly modelled this should be done and the resource use and emissions profile</u></p>	<p>Thank you for this comment. Since LEAP guidelines are attributional, it is not possible to consider substitution under these circumstances. The method considered here is consistent with the previous LEAP guidelines, and we have also added a new feature to consider the relative fertilizer value of manure. In this case, excessive manure applied is considered as waste on the accounting point of vue. Thus, we recommend no change.</p>

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87	grant	36	1253			ge	Benefits of manure to crop production result not only from N and P as implied but also can come from other nutrients like K, S, microelements	Include other elements	Adjusted by adding on line 1253, "including" before "N"
88	wilfart		1253					insert a comma after "P")	Done
89	wilfart		1256					change "those" to "these"	Done
90	vandijk	71	1257			Te	Manure can be processes to pellets and separated to concentrated products, the latter should be mentioned.	Manure can be sold on the market for further processing and/or application to land. Manure can be treated in biogas installations producing both energy and a digestate with fertilizer value. Or manure can be processed for better nutrient quality application and to reduce transport volume and costs, for example by drying to pellets or seperated into a liquid and solid fraction that can be up concentrated to fertiliser products, reducing transport volume and costs.	Accept but no change required. This addition is withing the existing word of 'for furthre processing'.
91	wilfart		1260					change "it generates" to "does it generate"	Done
92	wilfart		1265					insert "the" after "even"	Done

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93	wilfart	37	1268	4.3.4	paragraph	ge	<p>The guidelines propose considering manure as a co-product. This approach is not consistent with common practice, such as in existing reference databases such as ecoinvent (page 22 in Nemecek T. and Kägi T., 2007. Life cycle inventories of Swiss and European Agricultural Production Systems. Final report ecoinvent v2.0.) or AGRIBALYSE (page 35 in Koch, P. and Salou, T. 2016. AGRIBALYSE®: Methodology – Version 1.3. Angers: ADEME.).</p> <p>The proposed approach is difficult to apply in praxis, because often it is not known how the manure will be used. Part of it may be applied in excess of crop needs, while the rest may be applied according to crop needs. This means that this approach cannot be used to create data for a database. Furthermore this approach will mean that manure will “carry” a large part of the impacts of the livestock system,</p> <p>which means that it will be</p>	<p>The proposed rule could be modified as follows: “Manure shall not be considered as a co-product. The production and storage of manure is part of the animal production system. Emissions from any forms of treatment (nitrogen reduction, composting or anaerobic digestion), storage and mixing of manure are allocated to the animal production system, while emissions associated with loading, transport and spreading of manure are allocated to the plant production system that applies the manure.”</p>	<p>Reject. The report proposes a new approach for the allocation of manure addressing a major flaw of previous approaches, i.e. not appropriately considering the fertilizer value of manure. The purpose of the report is to provide best-possible guidance for environmental assessment related to nutrient losses, not to provide data for data bases. Note that the fact that manure application might become less desirable if it carries part of the livestock emissions will lead to a better evaluation of benefits versus risks associated with manure application.</p>

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	94	wilfart		1269				insert a comma before “including”	Done
	95	wilfart		1270				change “or” to “and” and “holds also” to “also holds”	Done
	96	grant	37	1275-1270	4.3.4		Although this priority system is generally applicable, it is not necessarily so when large excesses of nutrients are applied as livestock manure and small amounts of synthetic fertilizer are applied (eg started fertilizer placed near the seed)		No change. We agree with the comment. The authors of the report were discussing this during the writing process as well. However, for the sake of simplicity we dismissed to 'allow' for shares of synthetic fertilizers used in preference of available manure nutrients. For your information, the following note has been added to the beginning of Appendix 7 (Appendix 7. Approach to allocate upstream livestock emissions to manure and livestock products): "Note: A scientific paper describing the approach proposed has been prepared and is currently under review at the Journal on Environmental Management. If accepted, it will be published in a special issue of the journal "Nitrogen Solutions". "
	97	wilfart		1278				change “nutrient” to “nutrients”	Done
	98	grant	30	1282-1288			These statements are not clear and require further explanation		No change - cannot understand what this is referring to
	99	wilfart		1283				change “leave” to “leaves”	Done
	100	wilfart		1284				insert a comma after “energy”	Done

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101	wilfart		1286					change "on" to "of"	Done
102	grant	91	129			ge	Wording	pollutant	Done
103	wilfart		1290					change "it gives" to "gives"	Done
104	wilfart		1291					insert a comma after "type"	Done
105	wilfart		1297					change "where" to "when"	Done
106	wilfart		1303					change "possible different" to "different possible"	Done
107	wilfart		1305					change "a lot" to "greatly" and "imposed on the supply chain" to "imposed on it"	Done
108	Scarsbrook	139	1307			te	"...promotes planktonic growth of autotrophs (phytoplankton)." Ignores benthic growths of algae	Change to "...promotes benthic and planktonic growths of autotrophs (periphyton and phytoplankton, respectively)."	Done
109	wilfart		1307					change "tier" to "Tier"	Done
110	wilfart	38	1310-1336	4.4	paragraph	ge	This section mentions both "residues" and "residuals". "Residues" appear to be defined on line 1322, but I do not see a definition for "residuals". How do they differ?		Residuals were clearly defined in past guidelines and these were referred to
111	wilfart		1311					change "residuals" to "residues", which you use elsewhere	Done
112	wilfart		1314					this line uses "will be accounted for", while the previous line used "shall be accounted for"; suggest using the same verb throughout the manuscript ("will" or "shall")	Done
113	wilfart		1314					insert a comma after "inputs"	Done

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114	wilfart		1327					change "live weight" to "LW", the acronym that you defined previously	Done
115	wilfart		1328					insert a comma after "sold"	Done
116	wilfart		1329					change "where" to "when"	Done
117	grant	91	133			ge	wording	These guidelines (delete Yet,)	done
118	vandijk	39	1330			Te	Nutrient concentrations of animal by-products are also provided by INRA/FAO Feedipedia, that was referenced to in a section before in this report. Please add the reference the default data source		Done by adding "(e.g. FAO Feedipedia)" after "data" on line 1330
119	grant	39	1335			Ge	Wording	“, the emissions, and”	Done
120	wilfart		1335					change "the emissions" to "emissions"	Done
121	wilfart		1340					change "nutrients" to "nutrient"	Done
122	wilfart		1342					change "a separation into a solid or liquid part" to "separation into solid and liquid parts" and "relative" to "relatively"	Done
123	wilfart		1348					change "losses occur during composting which can" to "losses that occur during composting can"	Done
124	wilfart		1357					change "obstacles" to "obstacle" and "are the bacterial" to "is bacterial"	Done
125	wilfart		1361					delete the comma	Done

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126	grant	40	1364				Consider the impact of state-of-the-art technology used in recently constructed processing plants where 90-95% of the water is recycled.		Done. Line 1381 - replaced "the" with recycling or"
127	wilfart		1365					change "flocculation where" to "flocculation, in which" and "could" to "can"	Done
128	grant	40	1369-1372				Even though struvite recovery is a noble goal, it's not widely used. This section should note that P is recovered from only a small amount of wastewater and, furthermore, struvite is recovered from a much smaller proportion of wastewater.		Reject. The document is not quantifying any of the other statements in this section, so giving a quantification of struvite recovery would bias the document.
129	wilfart		1370					change "phosphorus" to "P" and move the definition of "struvite" (between parentheses) to line 1369, the first instance of "struvite"	Done
130	wilfart		1373					change "produced sludge" to "sludge produced" and "big" to "large"	Done
131	wilfart		1374					change "nitrogen" to "N"	Done
132	wilfart		1378					put "namely pathogens" in parentheses	Done
133	wilfart		1379					change "purposes and" to "purposes, but"	Done

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	134	wilfart	1380					change "microbial biomass up to 95% efficiency" to "up to 95% of microbial biomass"	Done
	135	wilfart	1382					insert a comma after "Finally" and change "like" to "such as"	Done
	136	wilfart	1384					change "Incineration can also be applied to the remaining sludge after the above-mentioned anaerobic digestion." to "The sludge remaining after the above-mentioned anaerobic digestion can also be incinerated."	Done
	137	wilfart	1385					insert a comma after "lost", change "could" to "can", and change "the regions" to "regions"	Done
	138	wilfart	1386					change "the use" to "their use"	Done
	139	wilfart	1387					change "where this is not available it" to "when these are not available, the latter"	Done
	140	wilfart	1392					change "across the whole" to "throughout the entire"	Done
	141	wilfart	1396					change "material" to "matter"	Done
	142	wilfart	1398					delete "the"	Done
	143	wilfart	1400					insert a comma after "respectively"	Done
	144	wilfart	1402					change "Where" to "when"	Done
	145	wilfart	1403					change "is" to "be" (subjunctive verb tense)	Done
	146	wilfart	1407					delete "the"	Done

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147	wilfart		1414					insert a comma after “exothermic” and change “for electricity generation” to “to generate electricity”	Done
148	wilfart		1421					insert “that” after “and”	Done
149	wilfart		1424					change “nutrients” to “nutrient”	Done
150	wilfart		1425					change “whole” to “entire”	Done
151	grant	91	143			ge	Wording	residue s	Done
152	wilfart		1431 and 1432					change “etc.” at the end to “e.g.” at the beginning of the list, for consistency with the other points in this group	Done
153	wilfart		1434					change “Ecoinvent” to “ecoinvent”, since the authors of ecoinvent do not capitalize it	Done
154	wilfart		1437					change “P related” to “P-related” and “P-inputs” to “P inputs”	Done
155	wilfart		1439					delete the comma	Done
156	wilfart		1447					change “Ecolnvent” to “ecoinvent”	Done
157	grant	43	1455			Ge	Punctuation	Need a period at the end of the sentence	Done
158	wilfart		1455					insert “).” at the end of the sentence	Done
159	wilfart		1459					change “from” to “to”	Done
160	wilfart		1461					change “Ecoinvent” to “ecoinvent”	Done
161	wilfart		1463					delete “process” and change “nitrogen” to “N”	Done
162	wilfart		1464					change “in cases where the” to “when” and “old design” to “old-design”	Done
163	wilfart		1467					change “Ecolnvent” to “ecoinvent”	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
164	wilfart		1468					change "emission factors" to "EFs"	Done
165	wilfart		1472					change "provision" to "supply"	Done
166	grant	44	1476			Ge	Wording	countries	Done by rewording toof the electrical mix in the country where the electricity.....
167	wilfart		1476					change "database EcoInvent" to "ecoinvent database"	Done
168	grant	44	1477			ge	wording	Delete "already"	Done
169	wilfart		1477					delete "already"	Done
170	wilfart		1479					change "at understanding and evaluating" to "to evaluate and understand"	Done
171	grant	45	1483			ge	Wording	impacts	Done
172	wilfart		1483					change "impacts" to "impact"	Done
173	wilfart		1488					change "life cycle inventory" to "LCI", which was defined previously in the text	Done
174	wilfart		1493					delete the comma	Done
175	wilfart		1495					suggest moving the definition of "areas of protection" to line 1493, the first instance of the term	Done
176	wilfart		1496					change "aims at protecting" to "aims to protect"	Done
177	wilfart		1497					change "The aggregation at endpoint" to "Aggregation at the endpoint"	Done
178	wilfart		1499					change "Life Cycle Inventory" to "LCI"	Done
179	robredo	45	1503			Ge		PO4-3 could be better than PO4 to mean "phosphates". It also appears in tables in pages 159, 160, 165, 172.	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
180	wilfart		1503					the first instance of "PO4" in the text; it should be defined as "phosphate" before this point (not defined until line 1565)	Done
181	wilfart		1510					insert a period after "6"	Done
182	wilfart		1517					change "nitrogen" to "N"	Done
183	robredo	46	1520			Ge		Write NH3 instead of NHy.	Done
184	wilfart		1520					if you did not mean "NHy", change it to something else, such as "NH3"	Done
185	wilfart		1525					change "for estimation of" to "for estimating"	Done
186	wilfart		1526					insert a comma after "diameter")"	Done
187	wilfart		1527					change "Phosphorus and phosphate mainly contribute" to "P and PO4 contribute mainly"	Done
188	wilfart		1529					change "Phosphorus" to "P"	Done
189	vandijk	81	1530			Te	What is mend with "but accurate quantification of some other compounds that can be important (e.g. indium and nickel) in livestock supply chains can be difficult." What is the link with the first part of the sentence?		Done. Inserted - ".....some other compounds in the resource depletion indicator that can be important for the resource depletion indicator....."
190	wilfart		1534					change "to" to "on"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
191	wilfart		1535					delete "nitrogen oxides" and "ammonia", since their chemical symbols will have been defined previously in the text ("nitrogen oxide" is not previously defined in the text (only in the Glossary), but should be)	Done
192	wilfart		1536					change "to soils either with low level of N or characterised by" to "on soils that have either low N contents or"	Done
193	wilfart		1540					delete "potentially", which is redundant with "can"	Done
194	Scarsbrook	47	1546-1550		5.1.1.2.1	te	Excesses of both N & P are usually required for the growth of nuisance algal blooms, but maximum algal biomass will be limited by the nutrient with lowest availability. P is often the limiting nutrient in freshwater because DIN is in often in excess (at least in terms of annual loading, but this varies seasonally).	Refer to Appendix 11, as this provides useful detail on nutrient limitation and eutrophication.	Done
195	wilfart		1547					change "Phosphorus" to "P"	Done
196	wilfart		1552					change "Nitrogen" to "N"	Done
197	wilfart		1553					insert a comma after "eutrophication"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
198	grant	48	1557-1566				What is the proposed strategy to inventory emissions from non-point source addition of nutrients? Is there data to support the "Conversion factor" expressing N compounds in P equivalents or the "fate factor and rate factor"?		Adjusted accordingly. "(described in section 5.2)" was added after "LCIA method" on line 1562.
199	wilfart		1559					change "as shown in Figure 7 for Eutrophication" to "(Fig. 7, for eutrophication)"	Done
200	wilfart		1560					do not capitalize "Impact Category"	Done
201	wilfart		1561					change "a characterisation factor" to "characterization factors"	Done
202	robredo	48	1565			Ge		PO4-3 could be better than PO4 to mean "phosphates".	Done
203	Lathuillière	48	1565-1566	5.1.2		te	"fate factor" "effect factor"	define both terms in the glossary	Described fully in text - no change
204	wilfart		1568					insert a comma after "crop"	Done
205	wilfart		1572					delete "a"	Done
206	grant	48	1572-1575			Ge	Citation needed	Where can these fate, effect and characterization factors be found?	A clearer description of these factors and their link to the Impact Assessment methods was added.
207	wilfart		1574					move "(CF)" to the first instance of "characterization factor" and then use "CF" consistently afterward	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
208	Scarsbrook	48	1574-1575			te	"In practice, the characterization factor (CF) available in an LCIA method combines the fate and effect components." This is an important comment and should be illustrated with an example.	Give example to illustrate how a CF would combine fate and effect components.	Done. An example was added
209	Lathuilière	149	1579-1580	Appendix 12		ed	The technologies...	I do not understand this sentence	Sentence was revised and greatly shortened for clarity
210	wilfart		1580					you mention "equivalency" factors in this line, but you have not mentioned or defined them previously	Done
211	launois	49	1585	5.1.2	Figure 7	Ge	The compartment dedicated to organic material in soil is missing in that Figure. According to us, the argumentation based on that Figure is distorted.		Accept. "e.g." has been added in the figure to indicate these are just two examples of gross inputs that can be used in a calculation
212	wilfart		1586					change "that vary with different" to ", all of which vary among"	Done
213	wilfart		1590					insert a comma after "SOx"	Done
214	wilfart		1596					change "impacts" to "impact"	Done
215	wilfart		1598					insert "substances" after "these", for clarity, and change "effect" to "effects"	Done
216	wilfart		1599					suggest deleting this second "potential" of the sentence	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
217	grant	50	1600-1633			ge	Table 1 is good, would be benefit if it could also list the different models for eutrophication by name	Expand table 1	Added the only one reference that applies
218	wilfart		1610					insert "the" before "country"	Done
219	wilfart		1612					insert "that of" before "Helmes" and "Cosme"	Done
220	wilfart		1613					change "geographical" to "geographic", for consistency	Done
221	wilfart		1614					insert a comma after "relevance" and delete "a"	Done
222	wilfart		1617					delete "a"	Done
223	wilfart		1618					change "Gabi" to "GaBi" and "Simapro" to "SimaPro"	Done
224	wilfart		1620					change "at a price in" to "at the price of"	Done
225	wilfart		1622					insert a comma after "studies"	Done
226	wilfart		1623					change "to a site in question" to "to a given site"	Done
227	wilfart		1624					change "are" to "be" (subjunctive verb tense) and "that inventory remains" to "that the inventory remain"	Done
228	wilfart		1625					change "the interpretation" to "interpretation"	Done
229	wilfart		1630					insert a comma after "generic" and change "when" to "for which"	Done
230	wilfart		1631					change "emissions" to "emission"	Done
231	wilfart		1633					insert a comma after "known" and change "characterization factors" to "CFs"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
	232	wilfart	1634					insert a comma after "eutrophication"	Done
	233	wilfart	1636					instead of using "spatially-specific", use one of the terms you used before, such as "site-specific" or "spatially-explicit"	Done
	234	wilfart	1639					insert a comma after "growth"	Done
	235	wilfart	1643					delete "different"	Done
	236	wilfart	1645					change "geographical" to "geographic", for consistency	Done
	237	wilfart	1653					change "tier" to "Tier"	Done
	238	wilfart	1655					change "Where" to "When" and "characterization factors" to "CFs"	Done
	239	wilfart	1656					change "these" to "they"	Done
	240	wilfart	1657					change "; b) they have" to "b) have"	Done
	241	wilfart	1658					change "for" to "to"	Done
	242	grant	50			Ge	Punctuation	"major inputs, especially"	done
	243	wilfart	1661					insert a comma after "inputs"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
244	wilfart	52	1665-1672	5.3.2	paragraph	ge	It is proposed to set characterization factors for N and P to zero when these nutrients are not limiting. Several objections can be made against this proposal. First, if a freshwater body is P-limited for eutrophication, this means that N does not limit eutrophication, but reducing N input may be useful to limit eutrophication in the long term. Furthermore, in the end the N will reach coastal waters, which are often N-limited. Second, if a freshwater body is known to be N-limited, this may mean that P is present in excess, so it is not a good idea to set characterization factors for P to zero.	We propose deleting this paragraph.	<i>Section has been revised accordingly, recognising limitation of existing main LCIA methods</i>

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
245	Lathuillière	52	1665-1677	5.3.2		te	"should" statements	This section only holds "should" statements meaning that there could be many deviations from the recommendations: i.e. based on knowledge on local N, P limitations, using the CML method or not, comparison with TRACI in North America etc. If the recommendations were to remain as "should" then I think that the practitioner should be guided into documenting these choices when applying the LCIA method.	At end of line 1677, add "The practitioner shall explain the basis for selection of the final choice of LCIA method(s) and fate factors used, according to the various points noted above."
246	wilfart		1666					change "characterization factors" to "CFs"	Done
247	wilfart		1667					change "regarding" to "about"	Done
248	wilfart		1668					change "characterization factors" to "CFs"	Done
249	wilfart		1670					change "characterization factors" to "CFs"	Done
250	wilfart		1671					insert a comma after "bodies"	Done
251	Scarsbrook	155	1672			ge	Term "bush" won't be known internationally	Change to "indigenous woody vegetation"	done
252	wilfart		1681					insert "the" before "ReCiPe"	Done
253	Lathuillière	52	1682	5.3.3		te	"it must be considered as tier 1"	This seems like a "shall" statement	done
254	wilfart		1683					change "tier" to "Tier"	Done
255	wilfart		1686					change "the European" to "European"	Done
256	wilfart		1689					insert a comma after "method"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
257	Lathuillière	52	1689-1694	5.3.4		te	See comment above (for L 1665-1677)		Done. At end of line 1677, added "The practitioner shall explain the basis for selection of the final choice of LCIA method(s) and fate factors used, according to the various points noted above."
258	wilfart		1692					insert a comma after "TRACI methodology"	Done
259	wilfart		1694					insert a comma after "recommendation"	Done
260	wilfart		1696					change "Goal and Scope" to "goals and scope", for consistency	Done
261	wilfart		1701					change "is" to "be"	Done
262	wilfart		1704					change "in" to "under"	Done
263	Scarsbrook	55	1716			ge	Sentence is difficult to understand	"Nutrients are part of natural biogeochemical cycles..."	Done
264	wilfart		1718					change "nitrogen" to "N"	Done
265	wilfart		1719					change "microorganisms receiving thus" to "microorganisms, thus receiving"	Done
266	wilfart		1722					change "reactive N" to "N"	Done
267	grant	55	1722-1725				Although both statements are true, the link between them is not evident.		Revised accordingly
268	wilfart		1723					change "For the assessment of" to "To assess"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
269	Scarsbrook	55	1723-1725			ge	Final sentence of the paragraph seems out of place and not linked to rest of text.	"We now find ourselves in the situation where the N cycle has exceeded a defined planetary boundary (Steffen et al 2015). Therefore, it is important that assessment of the sustainability of livestock supply chains, incorporates measurement of the efficiency with which nutrients are used (Gerber et al 2014)."	Done
270	wilfart		1724					change "of" to "with"	Done
271	grant	55	1724, 1727			Ge	Wording	"efficiency with which"	Done
272	wilfart		1726					change "The assessment shall be done" to "Resource use shall be assessed"	Done
273	wilfart		1727					change "of" to "with"	Done
274	wilfart		1730					change "nutrient" to "nutrients"	Done
275	wilfart		1733					change "the nutrient use efficiency at process level" to "nutrient use efficiency at the process level"	Done
276	wilfart		1733 and 1735					suggest moving these sentences to the paragraph that ends on line 1732, rather than keeping them alone in their own paragraphs	Done
277	wilfart		1736					change "include also Nr which" to "also include Nr, which"	Done
278	wilfart		1737					change "In order to" to "To"	Done
279	wilfart		1738					change "those" to "these"	Done
280	wilfart		1739					delete "e.g." or "etc.", but do not use both	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
281	vandijk	89	1744			ge	It is strong statement to mention accumulation of P in soils as a useful output of the livestock system. Indeed the question is if it stays available, both in quantity and in quality. The question is how you determine they are "available", in what period, at which location, in what depth, etc. We would like to suggest this one from the list of useful outputs, or make much more clear when it is useful, and when not and thus not seen as an useful output. Accumulation can never be a goal on its own, leaching and runoff will also increase.		Thank you. In P deficient soil, the accumulation of P is considered as a useful output because it contributes to the building up of P capacity which is necessary for the maximization of P uptake. It is necessary to measure the P content of the soil to define if the soil is saturated or not. Several examples are given in literature e.g. Schulte et al 2006. We addressed this comment by adding "but soil P should be monitored based on P index to avoid the risk of further leaching and runoff"
282	wilfart		1744					insert a comma after "changes")	Done
283	wilfart		1746					change "chain as far" to "chain, as long"	Done
284	wilfart		1747					change "are" to "be"	Done
285	wilfart		1748					change "they were inputted to" to "to which they were originally input"	Done
286	wilfart		1749					insert a comma after "wastes" and "those" after "as"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
287	grant	56	1750			ge	Wording	"agricultural or forestry"	Done
288	wilfart		1750					insert a comma after "sludge"	Done
289	wilfart		1752					insert a comma after "Nr"	Done
290	grant	56	1754-1756			Ge	punctuation	Change " ; " to , or " , and "	Done
291	wilfart		1760					suggest changing "proven" to "shown", since "proven" does not work well in a scientific document	Done
292	wilfart	56	1760-1761	6	paragraph	ge	How can one prove that nutrients added to (semi)-natural ecosystems contribute to maintaining those ecosystems in a healthy state?	We propose deleting this paragraph.	Agreed. We rephrased the sentence. Now the sentence reads: "Nutrient deposited to semi-natural ecosystems e.g. marginal areas, shrublands, sparse vegetation, etc, if it can be
293	wilfart		1761					change "those" to "these"	Done
294	wilfart		1764					insert a comma after "impacts"	Done
295	grant	56	1768			Ge	Wording	"positive or negative"	done
296	wilfart		1768					change "nor" to "or"	Done
297	grant	56	1770			ge	Not sure why P accumulation in soil is listed as an example deemed not useful, as this is a reserve that can be used for plant production in future years. This is not consistent with statement in line 1744.	Remove P accumulation in soil in statement on line 1770	Replaced "P accumulation" with "irreversible P absorption"
298	wilfart		1770					change "into" to "to"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
299	robredo	57	1778			Ge		(Equation 12: The reader could be reminded to use the same units in the formula, in order to get a dimensionless value for NUE)	Agreed. We addressed the comment.
300	wilfart		1786					change "of nutrient" to "of the nutrient"	Done
301	grant	57	1787				If the objective is to estimate nutrient balance (input/output), a detailed characterization of internal flows and/or transformations is not necessary.		No change. Internal flows are necessary as nutrients can be recycled across different stages of the supply chain; those flows are relevant for the NUE of the individual stages.
302	wilfart		1789					insert a comma after "upstream process"	Done
303	grant	57	1794			Ge	Spelling	"Appendix 13 for"	done
304	wilfart		1794					change "the matrix calculation" to "matrix calculation" and insert a space after "13"	Done
305	grant	58	1808				Use of the term "mobilised" is not clear. As stated above, conversion or transformation of nutrients within the production system does not result in the addition or removal of nutrients - they have been transformed.		Accept. The sentences have been changed to: "[...] divided by the amount of external nutrient additions to the supply chain to produce it. The quantification of external nutrient additions along the supply chain is quantified on the basis of a material flow analysis. "

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
306	wilfart		1808					change "The quantification of nutrient mobilisation along the supply chain is done" to "Nutrient mobilization along the supply chain is quantified"	Done
307	wilfart		1811					insert "the" after "as"	Done
308	Scarsbrook	162	1812		Figure 1	te	N flows are given as farm totals. Should be expressed on per hectare basis for consistency with guidelines.	Change N flow values to per hectare	Thank you. Agreed.
309	wilfart		1812					insert a comma after "products"	Done
310	Lathuillière	58	1816	6.2		ge	Pth element	Isn't this meant to be a small "p", not to be confused with phosphorous P.?	Agreed.
311	wilfart		1820					change "Life-cycle-NUE" to "LC-NUE", the acronym that you previously defined	Done
312	wilfart		1822					change "The case" to "Case"	Done
313	wilfart		1825					delete "a"	Done
314	wilfart		1831					change "A comprehensive" to "Comprehensive"	Done
315	grant	59	1833			Ge	Wording	". As such, the management of data quality..."	done
316	wilfart		1833					change "sources, as such" to "sources; as such,"	Done
317	grant	59	1838			Ge	Wording	"in accordance with the goal"	done
318	wilfart		1838					change "to" to "with"	Done
319	wilfart		1840					delete "a"	Done
320	wilfart		1846					change "The evaluation" to "Evaluation"	Done
321	grant	59	1851			Ge	Wording	"check allows to ensures that all"	done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
322	wilfart		1851					change "allows to ensure" to "allows practitioners to ensure" or "allows ensuring"	Done
323	wilfart		1852					change "to" to "with"	Done
324	wilfart		1856					change "on" to "about"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
325	wilfart	60	1864	7.3.2	paragraph	ge	The "Sensitivity check" section mixes descriptions of "sensitivity analysis" and "uncertainty analysis" together, when they should be kept separate. Though both types of analysis can follow the same methods, "uncertainty analysis" focuses on how uncertainty in input data influences uncertainty in model predictions (i.e., focus on output). In contrast, "sensitivity analysis" focuses on the relative influence of the input data themselves (i.e., focus on input). I suggest renaming section 7.3.2 as "Uncertainty analysis" and including only the middle three paragraphs in it (Steps 1-3), changing every instance of "sensitivity" to "uncertainty". I then suggest creating a new section 7.3.3 called "Sensitivity analysis" and including only the first and last (Step 4) paragraphs in it (perhaps referring to some of the information from Steps 1-3). One or		Agreed. We divided this section into uncertainty analysis (step 1-3) and sensitivity analysis (step4), however, as provided in ISO 14044, we kept all this approach under sensitivity check
326	grant	60	1868			Ge	Wording	"changing of input parameters"	done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
	327	wilfart		1868				change "The local" to "Local" and delete "of"	Done
	328	wilfart		1869				change "for each parameters" to "of each parameter"	Done
	329	wilfart		1870				change "The global" to "Global"	Done
	330	wilfart		1872				change "determine" to "determines"	Done
	331	wilfart		1874				change "nitrogen" to "N"	Done
	332	Lathuillière	61	1875	7.3.2	te	"Here, it is recommended to use"	This sounds like a "shall" statement, please clarify	Agreed.
	333	grant	61	1876		ge	Wording	"easy to conduct. However, "	done
	334	grant	61	1880		ge	Wording	"Input parameter"	done
	335	wilfart		1880				change "parameters" to "parameter"	Done
	336	wilfart		1881				change "gives" to "give"	Done
	337	grant	61	1882		ge	Wording	"recommends using a coefficient"	done
	338	wilfart		1882				change "to use" to "using"	Done
	339	wilfart		1883				insert "%" after "10"	Done
	340	wilfart		1885				change "with" to "by"	Done
	341	grant	62	1890-1891		Ge	Capitalization	First letter of each word in each technique name should probably be capitalized	Done
	342	wilfart		1890-1891				delete any acronym not used later in the text	Done
	343	wilfart		1893				change "goal" to "goals", for consistency, and delete "see"	Done
	344	wilfart		1894				delete "Monte Carlo simulations (" and ") since you have already defined the MCS acronym	Done
	345	wilfart		1895				delete the comma	Done
	346	wilfart		1899				change "to identify" to "for identifying"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
	347	wilfart		1900				change "hotspot" to "hotspots" and delete "Latin hypercube sampling (" and ") since you have already defined the LHS acronym	Done
	348	wilfart		1901				change "a similar technique to MCS" to "a technique similar to MCS"	Done
	349	wilfart		1904				change ", and how this" to "and how they"	Done
	350	wilfart		1907				change "to conduct" to "for conducting" and ", and to handle" to "and for handling"	Done
	351	wilfart		1916				change "to assess" to "for assessing"	Done
	352	wilfart		1918				change "could" to "can"	Done
	353	wilfart		1920				change "parameters" to "parameter"	Done
	354	wilfart		1922				change "the sensitivity analysis. The squared" to "sensitivity analysis. Squared"	Done
	355	grant	62	1923		Ge	Wording	Sobol's method (?)	Done
	356	Lathuillière	168	1923	Table 1	ed	Kg, l, kWh	Should be consistent with SI unit: kg, L, kWh	Done
	357	wilfart		1923				change "Sobol" to "the Sobol"	Done
	358	wilfart		1924				change "parameters" to "parameter"	Done
	359	grant	63	1925		ge	Wording	"classified as important" "Only , the important"	done
	360	wilfart		1925				change "in" to "as" and delete the comma	Done
	361	wilfart		1926				change "high quality" to "high-quality"	Done
	362	grant	64	1929		3	Ge	Wording "Produces similar robust uncertainty analyses as MCS, "	done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
363	Lathuillière	169	1931	Case Study 4		ed	FPCM	Please define this term	Done
364	wilfart		1932					change “flows” to “flow”	Done
365	wilfart		1934					change “goal” to “goals”, for consistency	Done
366	wilfart		1935					change “difference of” to “differences in”	Done
367	wilfart		1943					change “Nitrogen and Phosphorus” to “N and P”	Done
368	vandijk	66	1947			ge	Additional to emission footprints can also show the resource use per kg of products. So both emissions and resources should be mentioned.	N and P footprints are the sum of emissions that are caused by and/or the resource used by the production of one unit of final product.	Reject. Throughout the document, footprints are used in relation to emissions (both reactive and non-reactive).
369	launois	171	1952	Case study 4. Point 2.	Figure 1	Ge	This Figure takes into account soil’s stock. However, nothing is mentioned concerning the mineral fluxes until the consumers. What happens to urban effluents which contain minerals (e.g. domestic waste, sewage treatment plants sludge ...). If, the box called “manure imported” corresponds to that comment, we are the opinion that the wording is confusing.		In this system nutrient from retailers and household are not recycled back into this system because it is geographically disconnected from cities. Manure imported refers mainly to manure imported from the neighbouring regions or manure deposited from other animals such as sheep.

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370	Scarsbrook	171	1952		Figure 1	te	N flows are given for total farmed area. Should be expressed on per hectare basis for consistency with guidelines.	Change N flow values to per hectare	Agreed. We expressed N flows per ha basis.
371	wilfart		1952					insert a comma after "(N2)"	Done
372	wilfart		1955					change "nitrogen" to "N"	Done
373	Lathuillère	66	1957	7.4.1		te	"N and P footprints" could be	This is possibly a "may" statement, please clarify	Done
374	wilfart		1957					change "footprint" to "footprints"	Done
375	wilfart		1958					change "whole" to "entire"	Done
376	wilfart		1962					insert a period at the end of the line and begin the next line with "It"	Done
377	wilfart		1974					change "hot-spots" to "hotspots", for consistency	Done
378	wilfart		1976					change "The case" to "Case"	Done
379	wilfart		1977					change "the gross" to "gross"	Done
380	wilfart		1979					change "nutrient" to "nutrients"	Done
381	grant	67	1979-1980			ge	wording	Reword the first sentence" In livestock supply chains, some nutrients that are required in the process are of adequate quality to be used in the final products, but others are of lower quality.	Accept. First two sentences read now: "In livestock supply chains, not all nutrients that are required in the processes can be used directly in the final products, but are available to be recycled and used as input in a different process of the supply chain."

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
	382	grant	67	1980		Ge	Wording	cannot	Accept. First two sentences read now: "In livestock supply chains, not all nutrients that are required in the processes can be used directly in the final products, but are available to be recycled and used as input in a different process of the supply chain."
	383	wilfart		1980				change "can not" to "cannot"	Done
	384	wilfart		1984				change "that" to "to which"	Done
	385	wilfart		1985				insert a comma after "processes"	Done
	386	Scarsbrook	67	1987		ge	"...enables to separate such..."	Change to "...enables the separation of such..."	Done
	387	wilfart		1987				change "on" to "of" and "to separate" to "separating"	Done
	388	grant	62	1991			Regardless of the sensitivity analyses that are used, the range in possible values within the models must be appropriate for that particular measurement and the scenario to which is it applied.		Accept.
	389	wilfart		1991				change "independently" to "regardless"	Done
	390	wilfart		1993				insert "by" after "or"	Done
	391	wilfart		1999				change "whole" to "entire"	Done
	392	wilfart		2006				change "pose" to "provide"	Done
	393	wilfart		2008				change "goal" to "goals", for consistency	Done

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394	wilfart		2010					change "hot spots" to "hotspots", for consistency	Done
395	Lathuillière	68	2010-2013	7.5		te	"should" statements	It seems that these are "shall" statements, in other words: "conclusions of the study shall summarize supply chain hot spots", and "Conclusions shall be given in the strict context of the stated goal...".	Agreed.
396	wilfart		2012					change "goal" to "goals", for consistency	Done
397	wilfart		2013					change "goal" to "goals", for consistency	Done
398	Lathuillière	68	2014-2019	7.5		te	Comparative assertions	I prefer this more open recommendation for comparative assertions compared to the "shall not" statement on L398-399, but there is still a missing guideline on third party peer review prior to communicating this comparative assertion (this is only mentioned in section 7.5.3 and could be mentioned here as well).	We agreed that this section is not providing the comparison between two studies. These recommendations are included in previous LEAP guidelines referenced here. For critical review, we followed ISO and ILCD recommendation, this is provided in a separate section for clarity. No change required.
399	wilfart		2016					change "model" to "models"	Done
400	wilfart		2022					change "jointly" to "along" and delete "in order"	Done
401	wilfart		2025					change "goal" to "goals", for consistency	Done
402	wilfart		2027					insert a comma after "study"	Done
403	wilfart		2031					insert a comma after "documented"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
404	Lathuillière	68	2033	7.5		te	"The report should include"	Could this not be a "shall" statement? Or is it really meant to not be a requirement for these guidelines?	We agreed that should statement seems not strong here, but it is consistent with ISO 14044.
405	wilfart		2043					change "goal" to "goals", for consistency	Done
406	wilfart		2044					insert a comma after "recommendations"	Done
407	wilfart		2047					put "including consistency with these guidelines" in parentheses	Done
408	wilfart		2049					change "geographical" to "geographic", for consistency	Done
409	wilfart		2073					change "Report" to "The report"	Done
410	wilfart		228					insert "The" before "LEAP"	Done
411	grant		233			Ge	There is no summary of what the recommendations actually are, unlike the Carbon Stocks document. These really should be highlighted in the test and summarized in the executive summary.		Agreed. The summary will be prepared.
412	grant	xxviii	233				Wording	"the LEAP partnership"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
413	Lathuillière	26	233	4.2.5.1		te	"catch crop"	Do you mean "cover crop" as described in the glossary?	Accept. We have added to new entries in the glossary. Catch crops are grown in the period between two main crops in order to retain nutrients in the root zone. Cover crops are grown in the period between two main crops in order to protect the soil against erosion and minimise the risk of surface runoff by improving the infiltration.
414	vandijk	xxi	233	glossary		te	Definition of nutrient budget. In existing scientific terminology, budget is different and much simpler from a flow analysis. It does only include input and output flows from the system you are looking at. The internal flow, and source and destination of the flows are not analysed. But only input and output quantities.	A Nutrient budget consists of the quantification of all major input and output nutrient flows from and to the system that is analysed within given boundaries, in a given time frame (typically one year), as well as the changes of nutrient stocks within the respective sectors and media. Nutrient Budgets can be constructed for any geographic entity, for example at regional level (e.g. Europe), for country, for watersheds or even individual farm. [adapted from UNECE, 2012]	Accept. We have added a new entry in the glossary: A <i>Nutrient balance</i> consists of the quantification of all major nutrient flows across the boundaries of a given system, as well as the changes of nutrient stocks within the system. Flows that are internal of the system are not considered. The balance equation is 'Output + Stock_change – Input = 0'. [adapted from UNECE, 2012]

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415	vandijk	xvii	233	glossary		te	Definition of Flows "Flows of nutrient can occur as reactive nitrogen (Nr) or phosphorus." Should make a note that it is about this report, since nutrient flows can be any nutrient. Better is to have broader definition, since a definition should be broader then the scope of report.	"Flows of nutrient can occur as reactive nitrogen (Nr) or phosphorus in this study and report"	Modified accordingly
416	vandijk	xxi	233	glossary		te	Definition of nutrient should be more specific, key marconutrients	"Key macro nutrients are nitrogen, phosphorus and potassium, among other nutrients that are important as well in lower quantities"	Modified accordingly
417	vandijk	xxiv	233	glossary		te	Definition sewage sludge. Does not make sense to use "plant nutrients". Nutrients is clear enough, can include nutrients that are relevant for plants, but also for livestock and humans.	By-product of sewage treatment that concentrates solids. It contains significant quantities of various essential nutrients for plants and animals.	done

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418	vandijk	29	233			te	Definition of water: "So posing a risk of pollution but of little value as a fertiliser." Wastewater can have significant value as a fertiliser. So this definition does not make sense. Only if you want to distinguish different types of wastewater	A general term for contaminated water e.g. With faeces, urine, milk, chemicals etc. So posing a risk of pollution but potentially a significant value as a fertiliser.	Modified accordingly
419	wilfart		234					change "greenhouses" to "greenhouse"	Done
420	grant	Xxviii	240				Wording	"the livestock sector"	Done
421	grant	xxviii	241				Wording	"on the livestock stakeholders to adopt the sustainable..."	Done
422	wilfart		241					change "the livestock" to "livestock", "the sustainable" to "sustainable", and "the identification" to "identification"	Done
423	wilfart		243					change "resource" to "resources"	Done
424	vadas	85	2537	References		general	You are missing the Vadas et al. (2014) reference.	Vadas, P.A., D.L. Busch, J.M. Powell, and G.E. Brink. 2014. Monitoring runoff from cattle-grazed pastures for a phosphorus loss quantification tool. Agric. Ecosys. Environ. 199:124-131.	Done
425	wilfart		254					suggest changing "as to" to "on" or "about"	Done
426	wilfart		266					change "of 2016" to "2016"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
427	wilfart		267					suggest inserting "LCA" as an abbreviation after this instance of "life cycle assessment", or a later one, before line 411, when "LCA" first appears in the body of the text	Done
428	wilfart		270					insert a comma after "Italy"	Done
429	wilfart		277					insert a comma after "Italy"	Done
430	wilfart		278					change "organized from" to "held on" (for internal consistency in the sentence)	Done
431	wilfart		297					change "resources" to "resource"	Done
432	wilfart		299					change "best practice in reporting including the" to "best practices for reporting, including"	Done
433	wilfart		302					suggest changing "As case studies, these" to "The case studies"	Done
434	Lathuillière	98	304	Appendix 4		ge	0.01 mg litre-1	0.01 mg L-1	Done
435	wilfart		305					change "the nutrient" to "nutrient"	Done
436	Lathuillière	98	313	Appendix 4		ed	mg litre-1	mg L-1	Done
437	wilfart		331					change "losses" to "loss"	Done
438	wilfart		332					suggest changing "impact" to "impacts" (to encompass multiple impacts explicitly)	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
439	vandijk	36	333			te	Somewhere here also opportunities for better recycling of nutrients from by-products and waste should be mentioned.	Identification of opportunities to increase resource use efficiency and recycling, and productivity;	Done
440	grant	3	342	2			Wording	"Carbon" should be C"; water is not an element	Done
441	vandijk	37	342			te	What is mend with regularly recycled? For phosphorus global cycling is minimal and slow, there is no atmospheric phase.	Additional sentence for phosphorus that it differs from N, C and H2O	Revised (Dealt with in point number 3)
442	wilfart		343					change "have been" to "were"	Done
443	wilfart		344					change "also to" to "also for" (for internal consistency in the sentence)	Done
444	Scarsbrook	3	345-347	2		te	According to Steffen et al (2015) two of the nine planetary boundaries have been exceeded (biogeochemical flows and Genetic diversity. Both N & P have exceeded the planetary boundary for biogeochemical flows, not just N as quoted.	Change sentence to "Biogeochemical flows, incorporating both N & P cycles, is one of two planetary boundaries that has been surpassed (Steffen et al. 2015)." Use a separate sentence and appropriate reference to describe depletion of global P resources.	Done
445	wilfart		346					remove the comma after "boundaries" and change "getting" to "becoming"	Done
446	grant	3	350	2			Punctuation	Delete the comma after flows	Done
447	wilfart		350					remove the comma after "flows"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
448	wilfart		351					suggest inserting a comma after "pollutant" (to ease reading)	Done
449	wilfart		352					change "offer" to "offers" (subject-verb agreement)	Done
450	wilfart		356					suggesting changing "materials" to "ingredients" (for precision)	Done
451	wilfart		358					insert a comma after "categories"	Done
452	vandijk	37	359			ge	Add recycling to flows and losses, since that is an important objective in a circular nutrient economy. This could be made much more clear in the whole report.	estimation of nutrient flows, losses and recycling potential along livestock supply chains	Done
453	wilfart		361					use N and P instead of the chemical names, since the symbols have been defined	Done
454	wilfart		366					remove "nitrogen" and "phosphorous", leaving only the chemical symbols, since they were already defined in lines 340-341	Done
455	wilfart		368					change "or" to "and"	Done
456	wilfart		369					insert commas on both sides of "however"	Done
457	wilfart		370					change "nutrient" to "nutrients"	Done
458	grant	4	371	2.1			Wording	"assessment of the impact"	Modified accordingly
459	wilfart		371					insert "the" before "impact"	Done
460	wilfart		374					remove "the"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
461	wilfart		378					use N2O instead of "nitrous oxide", since the symbol has been defined	Done
462	wilfart		378					remove "(a greenhouse gas)", since "other greenhouse gases" in line 372 already gives this information	Done
463	wilfart		380					remove "the"	Done
464	grant	4	380-382	2.1			Confusing wording	Reword; correct punctuation	Corrected
465	wilfart		381					remove the lonely quotation mark or add another one to go with it	Done
466	Lathuillière	2	384	2		te	It would be valuable to outline the meaning of the recommendations here as "shall", "should" and "may" so that the reader has a sense of what the recommendations mean.	Add a paragraph at the end of Section 2 describing each term (see LEAP document from the Water Footprint group). Also, the guidelines should stay true to this designation, there are many "must" statements which are likely "shall" or "shall not" statements and should be revised throughout the guidelines. I've indicated as many as I could find below.	Agreed. A section is added.

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467	Lathuillière	4	398-399	2.1	4	te	The “shall not” seems too strong here to essentially forbid users of the guidelines to compare products when, in fact, comparison may be possible following an independent critical review process. This statement also seems inconsistent with L2014-2019 which is more flexible in terms of comparative assertions.	I suggest that this sentence be completed with a reference to ISO 14044 regarding critical reviews and their mandatory nature for comparative assertions (this is only mentioned in section 7.5.3, but should be mentioned here as well; one could also simply make reference to section 7.5.3. here).	Done
468	wilfart		399					change “a” to “one”	Done
469	vandijk	39	404			te	Which principles to you mean with “These principles are intended to be relevant to all varieties of livestock species and production systems.”		Accept. Replace 'principles' with 'guidelines'

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
470	grant	5	406	2.3			Normative references – Clearly define the “norm” or the basis of evaluating nutrient flows. For example, what P concentration thresholds are being used for surface water quality targets and the risk of eutrophication of freshwater lakes? Historical measurements for equivalent natural ecozones where animals are present? P concentrations in runoff from fertile, natural grassland are often greater than from rocky, mountainous regions, regardless of human activity.		Thank you for the comment. Here normative references refer to different international agreed guidelines for the LCA. No change required
471	wilfart		411					insert a comma after “studies”	Done
472	wilfart		414					insert a comma after “LCA”	Done
473	wilfart		420-421					suggest moving the abbreviations LCI and LCIA to their first instances in the body of the text (e.g. line 288)	Done
474	wilfart		420-421					suggest removing “the” and “phase” around “life cycle inventory” and “life cycle impact assessment”, since they have already been identified as phases	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
475	wilfart		426					remove the two "the" before "principles" and "procedures"	Done
476	wilfart		428					remove "the" before "ISO" and insert a space after "2006"	Done
477	grant	7	441	3.1		ge	Wording	"analyse the N or P use"	Reworded
478	wilfart	7	443	3.1	paragraph	ge	Please add climate change to the impact assessment, because N flows (N ₂ O) also have an impact on climate change.	(...), the inventory of nutrient pressure per unit of product will be used as input in the impact assessment for eutrophication, acidification, and climate change	Reject. This report focuses on the impact categories eutrophication and acidification which are specific for the environmental assessment of nutrients. Climate change has been extensively discussed in previous LEAP reports.
479	grant	7	444	3.1		Ge		"nutrient loss es hotspots"	Corrected
480	wilfart		444					change "losses" to "loss" and remove "the" after "prioritise"	Done
481	grant	7	445	3.1		Ge		"In the case of"	Revised
482	grant	7	445	3.1		Ge	Close the bracket	(see section 7)	Done
483	wilfart		446					change "in" to "with"	Done
484	grant	7	448	3.1		Ge	wording	"monitoring of the improvement" "reporting on the nutrient"	Done
485	wilfart		454					change "the nutrient flows" to "nutrient flow"	Done
486	wilfart		455					insert ")" after "7"	Done
487	Lathuillière	88	46	Appendix 1		ge	"must be selected"	"shall be selected"	Done
488	wilfart		466					insert a comma after "project"	Done
489	wilfart		469					insert a comma after "LCA"	Done
490	wilfart		475					change "nitrogen" to "N"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
491	wilfart	8	477	3.3	paragraph	ge	The phrase “used in a purposeful way” seems too vague. What do you mean, specifically? Is it related to “useful output” in line 502?		Accept. Sentence change to “[...] and purposefully used in a supply chain are [...]”
492	wilfart		477					change “nitrogen” to “N”	Done
493	wilfart		478					change “include also” to “also include”	Done
494	wilfart		480					suggest changing “wastages” to “waste” (unless HLPE (2014) really did use that term)	Done
495	vandijk	42	482			Te	Recycling flows can also be not digested or composted. So there can be more types of flows as now mentioned. For example add incinerated flows and the forthcoming residual ashes, since these can be significant, for example the incineration of sludge and meat and bone meal	Composted, digested, incinerated or any other type of treated food, losses or wastes, sewage sludge, wastewater, or emissions of Nr and P that are recovered and reused	Done
496	wilfart	8	485	3.3	paragraph	ge	Need a definition of “Spool” (stock change)		Already defined on line 515 in AU version (no change needed)

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
497	herman sen	9	486	3.3	Figure 1	ge	It seems to be an unconventional way in which the 'usefull' output is represented as changes of the pool - not least since in livestock systems, where also real changes in pools may often occur. The fact that you have to present a reference (that by the way apparently is not in the reference list) for this way of thinking under-pinnes that is unconventional.	Suggest to make an 'output' arrow in the figure and adjust the text accordingly	modified wording accordingly
498	wilfart		492					change "available;" to "available,"	Done
499	wilfart		493					change "complex;" to "complex, and"	Done
500	wilfart		495					For "handles", do you mean something like "levers" ("leviers" in French)? If so, we suggest the term "mechanisms".	Done
501	Lathuillière	9	497	3.3		ge	"must"	Likely a "shall" statement	Done
502	wilfart		498					insert a space after "Equation 1"	Done
503	Scarsbrook	9	501	3.3		te	$0 = \frac{F_n}{F_{ls}} + \frac{F_{res}}{F_{ls}}$ <p>Note that is not indicated in Fig. 1 as stated.</p>	<p>For consistency with Fig. 1 equation should be</p> $0 = \frac{F_n}{F_{ls}} + \frac{F_{res}}{F_{ls}}$	done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
504	wilfart		501					change "With" to "with" and "as indicated in Figure 1" to "(Figure 1)"	Done
505	wilfart		507					change "this" to "these"	Done
506	wilfart		510					insert a comma after "Appendix 1)"	Done
507	wilfart	10	510-517	3.4	paragraph	ge	Include a decision tree from IPCC or EEA to guide the choice of method for estimating emissions, instead of describing the choice in the text.	Ex : Figure 3-1 Decision tree for source category 4.B Animal husbandry and manure management from EMEP/EEA emission inventory guidebook 2009, updated June 2010	Reject. Current wording are sufficient to explain the modelling approach.
508	wilfart		514					change "is" to "are" (since "data" is a plural word)	Done
509	Lathuillière	10	516	3.4		ge	"must"	Likely a "shall" statement	DOne
510	wilfart		517					suggest changing "proven" to something like "demonstrated", since one cannot prove anything in science (technically)	Done
511	wilfart		519					insert a comma after "assessment"	Done
512	wilfart		522					change "GHG" to "greenhouse gas (GHG)", since this is the first instance of the term in the text	Done
513	wilfart		528					remove the term "life cycle inventory", since its acronym will already have been defined by this point	Done
514	Lathuillière	88	53	Appendix 1		te	"Tier 1 method should be used"	This seems more like a "shall" statement given the conditions of applying Tier 1 methods.	DOne

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
515	vandijk	45	530			te	In principle internal recycling flows should also be covered and separately analyzed. Calculating recycling a residual flow from all the other type flows is not enough in the basis. In this way flows and data can be crosschecked	quantification of nutrient flows, covering inputs, products, recycling and losses,	Revised accordingly
516	wilfart		533 and 535					change "animal feeds" to "animal feed" (term used as adjective, American English)	Done
517	wilfart		540					suggest changing "the resource" to "resource"	Done
518	wilfart	11	543	4.1	paragraph	ge	In later text, suggestions of data sources are given several times: an overall framework should be given at the beginning of the document.	Recommendation for data source of input of the system - Input from nature : collected data should be preferred, data from models or scientific publication may be used - Input from technosphere : data about practices should be collected, otherwise data from country-specific recommendation can be used	Agreed. We added a reference to section 10 of the existing guidelines
519	wilfart		546					change "the agricultural" to "agricultural"	Done
520	wilfart		549					change "where" to "in which" and "a multitude of" to "many"	Done
521	wilfart		550					change "schematic representation" to "diagram"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
522	wilfart	12	551	4.2.1	paragraph	ge	System boundaries for feed production should be defined (they are used in the following paragraphs).	System boundaries : - Soil in the root zone is part of the system - Temporal boundaries are from the land preparation for the feed crop to the land preparation for the following crop	Accept. Sentence added after the first paragraph in section 4.2.1: "System boundaries is the soil below the root zone. Temporal boundaries are from the land preparation for the feed crop to the land preparation for the following crop (see Section 4.2.5.1)."
523	wilfart	12	551	4.2.1	paragraph	te	Temporal boundaries recommended by LEAP are not consistent with existing reference databases such as ecoinvent (Nemecek T. and Kägi T., 2007. Life cycle inventories of Swiss and European Agricultural Production Systems. Final report ecoinvent v2.0.) or AGRIBALYSE (Koch, P. and Salou, T. 2016. AGRIBALYSE®: Methodology – Version 1.3. Angers: ADEME.). Please note that this comment is repeated for page 22.	Temporal boundaries are from the harvest of the crop preceding the feed to the harvest of the crop.	Reject. The guidelines propose a new definition of the temporal boundary in order to overcome problems that are associated with the definition of the 'harvest-to-harvest' definition, as a significant share of Nr emissions may be caused by the harvest but happen in the following period only.
524	herman sen	12	552	4.2		ge	release from unavailable soil pools seems contradictory	Delete unavailable	Done
525	wilfart		552					change "a share of" to "some of the" and "available by" to "available from"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
	526	wilfart		556				change "like" to "such as"	Done
	527	wilfart		560				change "or" to "and"	Done
	528	wilfart		561				remove this sentence, since its information is already given in lines 550-551	Done
	529	vandijk	47	562	Figure 3	te	Meat and bone meal, wastewater and sewage sludge used as fertiliser should be added as a potential input source of nutrients		Reject. These are covered within existing wording
	530	wilfart		563				change "Schematic representation" to "Diagram"	Done
	531	wilfart		564				suggest removing "around them", which seems redundant	Done
	532	wilfart		565				change "of the outcomes" to "on the results"	Done
	533	wilfart		569				change "nutrient" to "nutrients"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
534	wilfart	13	573	4.2.2.1	paragraph	te	The reference period chosen (from land preparation to land preparation for the next crop is not the same as that chosen by the main LCI databases for agriculture (ecoinvent 2.2 and 3.0, AGRIBALYSE and Ecoalim), which is from harvest to harvest. This creates a methodological gap between the commonly accepted methodology and the methodology proposed by LEAP.	Please refer to Nemecek, T., Kägi, T., 2007. Life cycle inventories of Swiss and European agricultural production systems. Final report ecoinvent report v2.0, n° 15. Agroscope Reckenholz-Taenikon Research station ART. Swiss Centre for Life Cycle Inventories. Zurich and Dübendorf, Switzerland. Koch P, Salou T. AGRIBALYSE: Methodological report - Version 1.2. Angers. France: 2015. Wilfart A., Espagnol S., Dauguet S., Tailleur A., Gac A., Garcia-Launay F., 2016.ECOALIM: A Dataset of Environmental Impacts of Feed Ingredients Used in French Animal Production. PLOS ONE, 11, e0167343.	Reject. The guidelines propose a new definition of the temporal boundary in order to overcome problems that are associated with the definition of the 'harvest-to-harvest' definition, as a significant share of Nr emissions may be caused by the harvest but happen in the following period only.
535	wilfart		575					insert a comma after "assumed"	Done
536	wilfart		582					change "legumes" to "legume"	Done
537	wilfart		583					change "proportion" to "percentage" and "between" to "among"	Done
538	wilfart		585					insert "the" before "share"	Done
539	wilfart	14	588-593	4.2.2.2	Paragraph + equation 2	ge	Need to define the factors Ffix and Fyield used in equation 2.		Revised accordingly

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
540	wilfart	14	588-593	4.2.2.2	paragraph + equation 2	ge	Table A3.1. could be included in the text		Referred to Appendix
541	wilfart	14	588-593	4.2.2.2	paragraph + equation 2	ge	Factors (CN ; Ffix) should have the same name in equation 2 and table A3.1 for better understanding		Done
542	Lathuillière	88	59	Appendix 1		te	"Tier 1 methods should only be applied"	This seems more like a "shall" statement given the conditions of applying Tier 1 method.	Done
543	wilfart	14	592	4.2.2.2	Equation 2	ge	Please change "Cn" to "CN"		Corrected
544	Lathuillière	14	597	4.2.2.2		ge	kg biomass-1	(kg biomass)-1 as previously	Done
545	Lathuillière	xiii	6			ge	CO2	Should read CO2 (2 typos in the ss game section)	Done
546	grant	14	603	4.2.2.2		Ge	Spelling	Change "less that" to "less than"	Done
547	wilfart		603					change "that" to "than"	Done
548	grant	14	606	4.2.2.2		ge	Capitalization	Recommend a universal search and replace of "tier" with "Tier"	Done
549	wilfart		606 and 607					change "tier" to "Tier"	Done
550	Scarsbrook	14	606-607	4.2.2.2		ge	"tier 1" & "tier 2"	For consistency "tier 1" and "tier 2" should be changed to "Tier 1" and "Tier 2"	Done
551	wilfart		607					change "where data is" to "when data are"	Done
552	wilfart		609					change "as" to "in"	Done
553	grant	88	61			ge	Wording	'start s'	Done
554	wilfart		611					change "between" to "among"	Done
555	wilfart		611					insert a comma after "Groom"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
	556	wilfart	614					delete "the" and insert a comma after "bedrock"	Done
	557	wilfart	616					change "one-quarter to a half" to "25-50%" (or, if you must, "one-quarter to one-half")	Done
	558	wilfart	621					change "in terms of" to "relative to"	Done
	559	wilfart	622					insert a comma after "periods" and change "various fertilizer products" to "fertilizers"	Done
	560	wilfart	623					insert "the" before "crop"	Done
	561	wilfart	624					change "data is" to "data are"	Done
	562	wilfart	626					insert a comma after "al."	Done
	563	wilfart	628					insert a comma after "N"	Done
	564	wilfart	15 631-632	4.2.2.5	equation	ge	Equation missing; please add the corresponding equation.		Reject. The text is clear and does not need to be accompanied by an additional equation.
	565	grant	15 634	4.2.2.6			Replace "mineral" or "inorganic" or "chemical" fertilizers with "synthetic" fertilizer. All matter is made from "chemicals" and the world's most popular synthetic fertilizer is urea, which is an organic molecule.		Revised accordingly
	566	wilfart	636					change "granule" to "granules" or "granulated"	Done
	567	wilfart	638					change "recommends" to "recommend"	Done
	568	Lathuillière	16 639	4.2.2.6		ge	per hectare and year	ha-1 y-1 as previously	done
	569	grant	16 648	4.2.2.6		ge	Wording	"is described in the LEAP"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
570	grant	15	653	4.2.2.4			The reference to P release from "bedrock" does not seem to be appropriate. Gardner and Hartmann refer to weathering from rock, but not necessarily "bedrock" ... weathering from soil minerals such as apatite may be significant, but there is little release of P from true "bedrock" which, by its nature, is not subject to as much weathering as surface soils. Also, if release of P from the stable, non-labile pool is regarded as a contribution to P balance, the reverse process of stabilization of labile P should be considered and deserves equal emphasis.		Done
571	wilfart		653					insert a "%" after "30"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
572	grant	16	655	4.2.2.7		ge	Limited discussion provided on manure nutrient release/availability estimates, but use of inappropriate coefficients can lead to significant source of model error, overloading/deficiency issues when not accounted for properly.	Suggest to state that more refined, specific manure nutrient availability estimates may be available for particular manure types and regions. Manure analyses can provide useful information to help predict availability. ~20% for organic N in manure in northern Great Plains would put you in the middle, but especially in case of feedlot manure, a fairly wide range depending on C:N ratio, especially as related to the bedding material mixed in with manure. A general reference would be Schoenau and Davis. 2006. Optimizing soil and plant responses to land-applied manure nutrients in Great Plains of North America. Canadian Journal of Soil Science 86: 587-595.	Agreed. We addressed the comment by deleting the sentence:"The level of potential mineralizable N was found to be ~45%...), because mineralization rate of manure would vary by animal species and region.
573	wilfart		655 and 656					use consistent spacing with "~"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
574	grant	16	655-656	4.2.2.7			This statement is an oversimplification of the variability in potentially mineralizable N across types and sources of manure. These figures should be reported as a much wider range, with an acknowledgment that these values vary substantially with animal species, feed source, bedding type and amount, environmental conditions, housing, manure handling & storage system, duration of manure storage, etc.		Agreed. Sentence is deleted.
575	grant	16	656	4.2.2.7		te	Need values for beef (feedlot and pasture) and dairy as well		Agreed. Sentence is omitted.
576	wilfart		663					remove comma after "applications"	Done
577	wilfart		666					insert "see" before "e.g."	Done
578	wilfart		669					insert a comma after "manures"	Done
579	grant	113	671-372			Ge	Title is incomplete	Pregnant what?	Accept. Add "heifers" after "non-pregnant"

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
580	grant	17	684-685	4.2.3		Ge / te	Rhizome may be a more familiar term than stolon for some. Stubble is not below ground biomass.	Remove "Below ground" from the start of that sentence.	On page 113, line 672 - added "heifers" after "non-pregnant"
581	grant	17	694-695	4.2.3.1		te	Unclear whether this statement applies to perennial forage crops, as all the examples are annuals		Accept. Changed to "for annual and perennial grasslands [...]"
582	wilfart	18	696	4.2.3.1	paragraph	ge	Feedpedia	Feedipedia	DOne
583	wilfart		700					suggest changing "anthesis" to "flowering", which seems more easily understood	Done
584	grant	17	704	4.2.3.2			Correct the spelling for Bittman ... not Bitman		DOne
585	wilfart		706					insert a hyphen between "peer" and "reviewed" and between "on" and "site"	Done
586	grant	18	707	4.2.3.4		ge	Plural	"data are"	done
587	wilfart		707					change "is" to "are"	Done
588	Lathuillière	18	708	4.2.3.2.		ge	"can"	Likely a "may" statement	Done
589	grant	18	709	4.2.3.4		Ge	Capitalization	Good Agricultural Practice for Reducing Ammonia Emission	DOne
590	wilfart		709					change "Framework Code of good agricultural practice for reducing ammonia emission" to the correct title, "Framework Code for Good Agricultural Practice for Reducing Ammonia Emissions"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response	
	591	wilfart	18	711	4.2.3.2	paragraph	ge	Equations should be given for the volatilization of NH ₃ and NO _x .	Reject. Principles and sources for EFs are given. The same exists for denitrification	
	592	wilfart		714				insert "and" before "emission"	Done	
	593	wilfart		716				change "2001 referred to in IPCC 2006" to "(2001), referred to in IPCC (2006)"	Done	
	594	wilfart		717				change "EEA air pollutant emissions Guidebook" to the correct title, "EMEP/EEA air pollutant emission inventory guidebook"	Done	
	595	wilfart		719				change "factors" to "factor"	Done	
	596	wilfart		721				remove the citation at the end of the sentence since it is already given in the body of the sentence	Done	
	597	wilfart		724				change "70 per cent of the" to "70% of"	Done	
	598	wilfart		728				change ", soil" to ", and soil"	Done	
	599	wilfart		729				change "simulating" to "predicting" for precision	Done	
	600	wilfart		732				change "for its estimation" to "for estimating them"	Done	
	601	wilfart		734				insert a hyphen between "peer" and "reviewed"	Done	
	602	Lathuillière	19	736	4.2.3.4		ge	"can"	Likely a "may" statement	Done
	603	Lathuillière	19	737	4.2.3.4		ge	"need to be quantified"	"should" statement (?)	Accept. Changed to "shall be quantified [...]"
	604	grant	19	738	4.2.3.4		ge	Wording	"also the impact" "is also being"	Reworded accordingly

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
605	wilfart		738					change "if also the impact on climate change is" to "if the impact on climate change is also"	Done
606	wilfart		740					suggest defining "UNFCCC" for a lay audience.	Done
607	wilfart		742					We do not understand what you mean by "The plausibility of the N2 flux estimate should be done", since one cannot "do" plausibility. Do you mean something such as "The plausibility...should be evaluated" or "The N2 flux should be estimated..."	Done
608	wilfart		745					change "to calculate the" to "for calculating"	Done
609	wilfart		746					change "calculates soil losses in a unit" to "predicts soil losses as a unit"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
610	grant	19	748-749	4.2.3.5			For estimating the loss of soil by wind erosion, contact Dr. Brian McConkey, Agriculture and Agri-Food Canada. Brian was co-author for: Lobb, D.A., Li, S., and McConkey, B.G. (2016). "Soil Erosion.", in Clearwater, R.L., Martin, T. and Hoppe, T. (eds.) - Environmental sustainability of Canadian agriculture: Agri-environmental indicator report series -- Report #4, Agriculture and Agri-Food Canada, Chapter 8, pp. 77-89.		No change
611	wilfart		750					change "a" to "the"	Done
612	wilfart		755					"They showed" is unclear, since the subject of the previous sentence is "The P erosion component". Are you referring to the factors considered by the P-erosion component? If so, I suggest making this sentence clearer.	Done
613	wilfart		759					remove "The" and define "DON" and "Norg" (which do not seem to be defined in the text)	Done
614	grant	20	759, 760	4.2.3.6		Ge	Subscripts	Universal search and replace of Norg and Porg with Norg and Porg throughout	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
615	wilfart		760					define "Porg"	Done
616	grant	20	762-765	4.2.3.6			Mineral P is not the only form of P that can leach. Organic P also moves through the soil by leaching, especially through preferential flow paths. Also, the statement regarding P leaching in clay is not true because some clays have substantial numbers of preferential flow pathways.		Accept. 'Mineral' deleted from sentence (also organic nitrogen can be subject to leaching). Added reference to preferential flow to the following sentence: "Soils with fine texture (high clay content) are in general less susceptible to leaching than those with coarse texture (high sand content) because they are much less permeable to water, although this can be bypassed on clay soils with preferential flow pathways."
617	wilfart		764					suggest adding "content" after "clay" for precision	Done
618	wilfart		764					change "fine-texture" to "fine texture", since it is not used as an adjective	Done
619	wilfart		765					change "sandy-textured" to "those with coarse texture (high sand content)" to follow the same format as earlier in the sentence	Done
620	wilfart		765					change "water permeability is much lower" to "they are much less permeable to water"	Done
621	wilfart		766					insert a comma after "water"	Done
622	wilfart		768					insert a hyphen between "peer" and "reviewed"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
623	Lathuillière	117	769	Appendix 7		ed	“he generates”	The term implies only male farmers. Replace by “the farmer” or “he/she”	done
624	herman sen	20	770	4.2.3.6		ge	Leaching in case of no more detailed model is suggested to be calculated as a fraction. It is not clear what it should be a fraction of ??.		Changed sentence 'In this case...' to 'According to the IPCC (2006) methodology, the leaching fraction is multiplied with the total N input from the various N sources to calculate the N leaching.'
625	Lathuillière	20	772	4.2.3.6		te	“where rainfall is lower than evapotranspiration”	This definition of dry area is missing a timeframe. Also, dry areas are often defined comparing evapotranspiration (ET) to reference evapotranspiration (ET0) on an annual basis. I suggest removing this section and writing “Conversely in dry areas, values for leaching...”.	Reject. Seasonal differences are important drivers for N and P leaching and runoff losses; annual values will not capture the N flow dynamics
626	wilfart		772					insert a comma after “Conversely”	Done
627	wilfart		773					insert a comma after “evapotranspiration”	Done
628	wilfart		773					change “values...is” to “values...are” or “value...is”	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
629	grant	118	777-780				As many agronomists know, optimum rates of fertilizer are much more difficult to predict than this and are highly variable across situations such as type of land, current and historical management practices, and weather conditions ... how do the modellers know what rate is optimum?		Accept. Indeed it is difficult to predict optimum rates of fertilizer applications. We have elaborated pragmatic solutions how this theoretical approach can be implemented and show this on examples in a paper which is going to be submitted soon. The following note has been added to the beginning of Appendix 7 (Appendix 7. Approach to allocate upstream livestock emissions to manure and livestock products): "Note: A scientific paper describing the approach proposed has been prepared and is currently under review at the Journal on Environmental Management. If accepted, it will be published in a special issue of the journal "Nitrogen Solutions". "
630	wilfart		778					change "Care has, therefore, to be taken to avoid" to "Care has to be taken, therefore, to avoid", which flows more easily	Done
631	wilfart		779					insert a hyphen between "double" and "counted"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
632	vandijk	54	782			te	Leaching can be a significant loss on land were P levels in soils are high and the ground water level is close to the surface level. Please make this more clear, since especially for areas/countries with high levels of accumulated P in soils this should be quantified in a flow analysis.	Add additional sentence: Leaching can be a significant loss on land were P levels in soils are high and the ground water level is close to the surface level.	Revised accordingly
633	wilfart		782					change "phosphorus" to "P" for consistency of abbreviation use	Done
634	grant	20	782-786	4.2.3.6			This assumption about the lack of P leaching is outdated. Recent research in humid areas (eg. the US cornbelt and Sweden) has measured substantial subsurface losses in tile drained land, in particular.		Revised accordingly
635	wilfart	20	787	4.2.3.6	paragraph	ge	Need to define "P index"		Done
636	wilfart		789					insert a hyphen between "area" and "specific"	Done
637	wilfart		791					insert "for it" after "methods" for clarity	Done
638	wilfart		792					insert a hyphen between "excess" and "fertility"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
639	wilfart		793					change the comma after "runoff" to a semi-colon	Done
640	wilfart		798					insert a comma after "decompose"	Done
641	grant	21	798-819	4.2.4.1			Crop residues are not an "input" of nutrients but rather a form of recycled nutrients in the system.		Accept. Yes, crop residues are considered as recycled nutrient - this is why it is considered in the section on 'internal flows.' The wording has been changed from 'nutrient input with' to 'nutrient release from' in section 4.2.4.1.
642	grant	21	798-819	4.2.4.1			Also, variability in the time of nutrient release from manure and green manure is dependent on many factors including mass of material, type of material, moisture, temperature, etc.		Accept but no change required. Please check lines 804-806 where all those factors are listed: 'The rate of mineralization of crop residues, and thus the availability for subsequent crops, depends on the quality of the residue, such as its lignin content and C:N ratio, soil properties, meteorological conditions and crop management related factors.'
643	grant	21	800	4.2.4.1		Ge	Wording	Delete ", generally by sheep and/or goats"	Done
644	wilfart		801					change "mineralization" to "mineralize"	Done
645	wilfart		804					insert "of its nutrients" after "availability" for precision and clarity	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
	646	wilfart		806				suggest inserting hyphens between "crop" and "management" and "related"	Done
	647	wilfart		808				change "with" to "from" and "is" to "are"	Done
	648	wilfart		808				"it" is unclear; do you mean "the latter"?	Done
	649	wilfart		810				change "with" to "from"	Done
	650	wilfart		811				change "are" to "is" and "fraction" to "ratio"	Rejected
	651	wilfart		812				change "fraction" to "ratio"	Rejected
	652	wilfart		813				suggest changing "a number of" to "several"	Done
	653	wilfart		817				change ", but" to "; instead,"	Done
	654	wilfart		818				insert a comma after "manure"	Done
	655	Lathuillière	22	819	4.2.4.1	ge	"can"	Likely a "may" statement	done
	656	wilfart		820				change "the input of nutrient" to "nutrient input"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
657	wilfart	22	820-832	4.2.4.1	paragraph	te	Temporal boundaries recommended by LEAP are not consistent with existing reference databases such as ecoinvent (Nemecek T. and Kägi T., 2007.Life cycle inventories of Swiss and European Agricultural Production Systems. Final report ecoinvent v2.0.) or AGRIBALYSE (Koch, P. and Salou, T. 2016. AGRIBALYSE®: Methodology – Version 1.3. Angers: ADEME.). Emissions from residues are not shared among crops in a crop sequence, as they are in AGRIBALYSE or IPCC methods.	N2O emissions from crop residues of the feed are allocated to the feed. According to AGRIBALYSE, crop residues left in the field tend to capture N and decrease nitrate emissions during the winter following the crop studied (and thus to decrease the emissions attributed to that crop).	Rejected. Please check response to comment Grant, line 798-819. In addition, we like to note that the beneficial effect of crop residues is caused by the harvested crop and it therefore appropriate to give credit to the harvested crop for the reduced emissions. If however, the crop residues are left in the field to improve the yield of the following crop, not taking the opportunity of other uses of the crop residues, this can be seen as land preparation for the following crop.
658	Lathuillière	22	826	4.2.4.1		ge	“are entirely allocated”	“shall be entirely allocated”	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
659	wilfart	22	829-832	4.2.4.1	paragraph	te	The document states "emissions from residues of green manure or the previous crop after (soil preparation) are accounted as nutrient loss for the current feed crop". How can one know the proportions of total emission occurring before and after the date of soil preparation?		Accepted but no change required. This is indeed difficult, but the difficulty is not dependent on the choice of the cut-off date, but rather inherent to the high temporal variability of the emissions.
660	wilfart		830					change "as well as" to "as are"	Done
661	wilfart		831					change "nutrient" to "nutrients"	Done
662	grant	22	835			ge	wording	"occurs" should be "occur"	Done
663	wilfart		835					change "pools in decreasing" to "pools, in order of decreasing"	Done
664	wilfart		838					change "urea, uric acid, quickly" to "urea and uric acid, which are quickly"	Done
665	wilfart		842					change "present organic matter" to "the organic matter present"	Done
666	grant	22	844			ge	Wording	Delete "Decreases of"	Done
667	wilfart		845					insert a comma after "change"	Done
668	wilfart		847					change "nitrogen" to "N"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
669	grant	23	849				This paragraph requires further clarification. As stated, it suggests that it is possible to extrapolate change in stocks when change in stocks is assumed to be zero.		Revised wording
670	wilfart		849					change "a first" to "an initial"	Done
671	Lathuillière	89	85	Appendix 1		ge	"These models need to be"	"should be"	Done
672	wilfart		852					change "methodology of extrapolating" to "method for extrapolating" and "where" to "in which"	Done
673	wilfart		854					change "a minimum and a maximum value" to "minimum and maximum values"	Done
674	wilfart		855					change "poor data situation" to "data-poor situation" and "is proposed" to "was developed"	Done
675	wilfart		856					change ", where the nutrients" to "where nutrients"	Done
676	wilfart		858					insert a comma after "yield"	Done
677	wilfart	23	859	4.2.4.2	paragraph	te		To close the balance of nutrients, the N and P stock changes should be estimated. For now, there are no methods allowing such estimations. N and P soil stock changes shall be estimated as soon as a method with low-enough uncertainties is available.	Accept but no changes required. For N, this is already proposed in section 4.2.4.2 (see lines 847-859). For P, a budget-equation is given with Equation 4
678	wilfart		859					change "occurring for" to "by"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
679	wilfart		863					change "Solution" to "Soluble", for consistency	Done
680	grant	23	864			Ge	Superscripts	Universal search and replace of L-1 with L-1	done
681	Lathuillière	23	864	4.2.4.3		ge	mg L-1	mg L-1	done
682	wilfart		864					make "-1" an exponent and insert a comma before "largely"	Done
683	grant	23	865				Organic P transformations should also be acknowledged, e.g., P mineralization and immobilization are also important for controlling soluble P concentrations in soils - see Dodd & Sharpley 2015		Wording revised accordingly
684	grant	23	866				Upper estimate for organic P is low; raise it to at least 80% - e.g., Tiessen et al. 1982 found that Canadian soils could have 80% of their soil P in organic forms.		Done
685	wilfart		866					insert "%" after "30"	Done
686	wilfart		869					insert a word such as "necessary" or "required" before "to meet plant requirements"	Done
687	wilfart		873					insert a period after "4"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
688	wilfart		874-876					I suggest deleting this second sentence and moving its information into the figure itself, using boxes or lines to represent the Precalcitrant box and Psorbed boxes. I also suggest repeating the information "Psorbed is represented by all three pools on the right" in a sentence in the text, to help readers understand the text separately from the figure.	Done
689	wilfart		875					insert a comma after "Precalcitrant"	Done
690	wilfart		877					move "again" from this location to line 878, after "available"	Done
691	grant	89	88			ge	Wording	inthe example	done
692	wilfart		881					change "termed" to "called" and ", and is represented by the right-most pool in Figure 4" to "(right-most pool in Figure 4)"	Done
693	wilfart		882					change "Phosphorus" to "P"	Done
694	grant	24	884			Ge	Subscripts	Fix the subscripts after P	Done
695	Lathuillière	24	884	4.2.4.3	Equ. 4	ge	Precalcitrant, Pavailablesorbed, Psolution	All terms should be subscripts following P	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
696	grant	24	888-889				There are several methods for determining recalcitrant vs. labile P ... eg. Hedley fractionation, ³² P isotopic exchange, etc. Also, here and elsewhere (eg. Figure 4), the retention process is focused only on adsorption (eg. Langmuir or Freundlich equations), without appropriate acknowledgement for the role of precipitation and immobilization as additional mechanisms for retaining P.		No change: The term sorbed P is used as a general term that includes precipitation (including based on how it is usually assessed). So we feel this is adequately covered under P _{sorbed} .
697	vadas	24	889	4.2.4.3 and also Appendix 4		technical	Consider work by Vadas using the EPIC model basis to easily quantify soil P pools and changes over time.	Vadas, P.A., B.C. Joern, and P.A. Moore, Jr. 2012. Simulating soil phosphorus dynamics for a phosphorus loss quantification tool. J. Environ. Qual. 41:1750-1757. Vadas, P.A., and M.J. White. 2010. Validating soil phosphorus routines in the SWAT Model. Trans. ASABE. 53:1469-1476.	No change here, but referred to in another part

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
698	grant	25	896			ge	Assumption that "recalcitrant" P pool in soil becomes full and all additional P goes into "available" pool likely not correct for all soils such as calcareous soils where precipitation of phosphate with calcium dominates.		No change: See comment above. Also - If <i>Psorbed</i> at the eutrophic trigger level is determined – this effect is accounted for. So, nothing need be changed given that the next level of detail is to measure <i>Psorbed</i> at the eutrophic trigger level.
699	wilfart		896					change "where" to "when"	Done
700	grant	25	896-906				This is an over-simplified approach to estimating P retention in soil. Further, agronomic availability is highly variable. The reference cited here (Redding et al., 2016) is applicable to 4 soil types in Australia and therefore has limited application from an international perspective.		Rejected. The challenge of this report is to provide methodologies that can be used in a large number of situations. Compromises have to be made between considering large variability and dependencies of a large number of factors versus feasibility of quantification of flows. We are aware of the limited number of observations this approach is based on, however, we believe that the approach still provides a pragmatic and scientifically justifiable method for estimating Precalcitrant
701	grant	25	898			ge	subscript	<i>Psorbed</i> should be <i>Psorbed</i>	Done
702	wilfart		898					change " <i>Psorbed</i> " to " <i>Psorbed</i> " and "to" to "of"	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
703	grant	25	902			te	Methodology clarification	The LEAP guidelines regarding C stock changes recommend sampling to 30cm; these guidelines recommend 1m for P. Granted, the biochemistry, etc. will differ between C and P. But do you have any thoughts on whether 30cm is deep enough for long-term C stocks, particularly on perennial grasslands?	No changes required. A reply could be made that total P may vary less with depth and that practicality must be considered. The wording here does state to use the depth for which data is available
704	Lathuillière	25	902	4.2.4.3		ge	kg/m ³	kg m ⁻³	Done
705	wilfart		902					“BD is the bulk density of the soil (kg/m ³) and” can be deleted, since BD was already defined in line 893	Done
706	wilfart		902					insert a comma after “(m)”	Done
707	wilfart		903					change “(or where the soil depth is less than 1 m, use the soil depth)” to “or the soil depth, whichever is shallower”	Done
708	wilfart		904					insert “that of” after “to”	Done
709	wilfart		905					change “Where” to “When”	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
710	herman sen	25	909	4.2.5.1		ge	<p>The question about allocation between multiple crops in a crop rotation has been recently addressed in a paper Goglio P, Brankatschk G, Knudsen MT, Williams AG, Nemecek T (2017) Addressing crop interactions within cropping systems in LCA. The International Journal of Life Cycle Assessment. https://doi.org/10.1007/s11367-017-1393-9</p> <p>They give the following suggestion which I think could be useful to mention. For product LCA:</p> <ol style="list-style-type: none"> 1. The environmental burden of cropping system issues easily related to the crop should be fully attributed to the corresponding crops (Table1). For instance, for a crop management practice (seeding), the emissions of machinery should be attributed to the corresponding crop when the crop management practice occurs. 2. For the environmental burden of cropping system 		<p>MOdified accordingly. The following was added to line 913 in original (i.e. at end of par. 1 of section 4.2.5.1): "However, where emissions can be specifically related to a single crop (e.g. NOx from fuel use for specific crop activities), they should be fully attributed to that crop (Goglio et al., 2017).</p>

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
711	wilfart	25	910	4.2.5.1	paragraph	ge	The text mentions "biophysical allocation", but there are many ways to perform biophysical allocation. The sentence is too vague; please describe a specific biophysical allocation procedure.		Rejected. The following paragraph (line 915ff in the original document) is describing the approach to be taken
712	Lathuillière	25	911	4.2.5.1		te	"is recommended"	It is unclear whether it is a "shall" or "should" recommendation	Changed to shall
713	Lathuillière	123	913		Table A8.4	ed	P2O5, K2O	P2O5, K2O	No change. elemental units have been used is preferred descriptor

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
714	wilfart	25	914-919	4.2.5.1	paragraph	ge	We do not understand what this paragraph tries to say.		Accept. The paragraph has been completely revised. "If a different crop is cultivated in a field after a field crop or vice versa, emissions as calculated using the methodologies given in section 4.2.3.2. through 4.2.3.6 needs to be allocated between the two crops. This concerns in particular emissions caused by crop residues and organic fertilizers including manure. Some of the emissions clearly related to the cultivation of a crop occur as a consequence of and therefore after harvest of the crop (e.g. nitrate leaching). Emissions shall be allocated in proportion to the share of nutrient remaining in the soil at a defined cut-off date, The cut-off date is defined as the start of land preparation for a crop. Thus, the temporal boundaries for the allocation of emissions to a feed crop are from land preparation for the feed crop to land preparation for the following crop."

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
715	Lathuillière	25	918	4.2.5.1		te	Reference period	Please confirm whether this timeframe is annual, or multi-annual	No change required. Land preparation might be done annually, but could also be done with other time frames. This depends on the specific situation.
716	wilfart		919					change "preparations" to "preparation", for consistency	Done
717	wilfart		920					change "as adding" to "to add"	Done
718	wilfart		921					change "section" to "sections"	Done
719	wilfart		922					insert a comma after "used"	Done
720	wilfart		923					change "losses of N2O" to "N2O losses", for consistency	Done
721	wilfart		924					change "independently" to "regardless"	Done
722	wilfart		925					"which are planted with the nutrients for the following crop as co-product" is really unclear. Do you mean something such as, "whose nutrients are considered a co-product for the following crop"?	Done
723	wilfart		927					change ", thus" to "; thus,"	Done
724	wilfart		928					I believe you mean "catch crop" instead of "catch"; if so, you need to define "catch crop" earlier in the text.	Done
725	grant	89	93					"fewer experimental observations"	done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
	726	wilfart		930				If I understand what you mean (growing a catch crop instead of leaving the soil bare), I think you should change “if the soil is left bare” to something such as “if the soil would otherwise be left bare”. Even with this change, it is unclear if you are referring to soil that would otherwise be left bare immediately after the previous crop, or after some other crop during the year.	Done
	727	grant	26	934		ge	Wording	“lead” should be “leads”	Done
	728	wilfart		944 and 945				insert hyphens between “field” and “gate” (one instance per line)	Done
	729	wilfart		946				change “mainly be related” to “be related mainly”	Done
	730	wilfart		948				insert “respectively” after “compartments”	Done
	731	grant	26	950		Ge	Wording	damages should be damage	Done
	732	wilfart		950				change “fungi damages” to “fungal damage”	Done
	733	grant	26	952		ge	Wording	can should be may	Done
	734	wilfart		952				delete “the use of” and change “product” to “products” (to go with the “they” in the sentence that follows)	Done
	735	wilfart		954				change “The quantification of these flows shall be done” to “These flows shall be quantified”	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
736	wilfart		955					change "kg N or P" to "kg N and P, respectively" and move the "-1" to inside the parentheses	Done
737	Lathuillière	26	956	4.2.5.1		te	Secondary sources	It sounds like this could be associated to a "may" recommendation	Revised accordingly
738	wilfart		965					delete "see"	Done
739	wilfart		971					delete "different"	Done
740	wilfart		975					change "present" to "have"	Done
741	wilfart		976					change "buffalo" to "water buffalo", for precision	Done
742	Lathuillière	89	97-98	Appendix 1		ge	"Measurements need to be done following sampling"	"Measurements should follow sampling and measurement..."	done
743	wilfart		980					change "carbon" to "C"	Done
744	wilfart		983					delete "a"	Done
745	grant	27	988			Ge	Spelling	silvopastoral	Done
746	wilfart		988					change "they may involve" to "involved in"	Done
747	wilfart		989					change "according to different" to "depending on the"	Done
748	grant	127	991			ge	Formatting	1.27%(remove space)	Done
749	wilfart		996					insert a comma after "areas"	Done
750	vandijk	62	998		Figure 5	Te	Supplements can be everything. Probably you mean Animal feed supplements, if not, it should be added as a significant input flow. Make more clear in the text what you mean with Animal additives, different from supplements?		Agreed. Figure is edited.

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
751	wilfart		Abbreviations and Acronyms					add "TAG" for "Technical Advisory Group"	Done
752	Lathuillière		ALL			ge		A list of symbols would be very helpful in these guidelines; there is one on p 125, but I think it should appear at the beginning of the document and include all symbols mentioned in the guidelines.	Accept. We added the list of symbol.
753	wilfart		all				Grammar, word choice, readability, and spelling: The following comments come from the team's native English speaker, who spends a lot of time reviewing the English of scientific manuscripts submitted by non-native-English speakers. The following suggestions are mainly to correct/improve the English grammar, but also to increase understanding and consistency of the text:		Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
754	wilfart		all				Overall, the text, once in "final" form, needs to have correct and consistent English grammar (see my suggestions below). Since it is the fruit of several authors, it also needs to have consistent use of terms and their abbreviations, each of which should be defined only once in the text, after the first instance of a given term. Currently, the text goes back and forth between certain terms and their previously-defined abbreviations.		Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
755	wilfart		all				<p>Also, I suggest standardizing on British or American English. Most of the English appears American except for certain instances: in Glossary: "mineralising", "Faeces", "metre", "kilometre", "faecal", "fertiliser", "programmes" on line 427, "prioritise" on line 444, "rigour" on line 453, "Generalised" on line 488, 543 and 1000, "organised" on line 532, "regionalised" on line 750, "As" on line 1043, 1233 and 1290 (American is "Since"), "centres" on line 1397, "Fertiliser" on line 1406, 1408, and 1410, "sulphur" on line 1412, "petrol" on line 1465 (American is "gasoline"), "modelled" on line 1487, "characterisation" on line 1562, "recognised" on line 1580, "modelling" on line 1596, 1604, 1610, 1620, 1646, 1652, 1662, 1675, and 2059, "fibre" on line 1743, "mobilised" on line 1808, 1811, 1812, and 1818.</p>		Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
756	wilfart		Figure 2					changed "Feeds" to "Feed" and "waste-water" to "wastewater" for consistency with the text	Done
757	wilfart		Figure 3					change "Deposition" to "deposition" and "Fixation" to "fixation" (for standard capitalization), "Bed rocks" to "Bedrock", and "reuse water" to "reused water" or "gray water" (if I understand it correctly)	Done
758	wilfart		Figure 5					change "live-animals" to "live animals", "corn" to "maize", "alfalfa" to "lucerne", "free stall barns feedlot" to "feed stall, barns, feedlot", "N organic" to "organic N"	Done
759	wilfart		footnote 10					change "not considered to be 'linked' to the waste flow any more" to "no longer considered to be 'linked' to the waste flow"	Done
760	wilfart		Table 3					change "analyses than" to "analyses as" and "tailed (skewed)" to "skewed"	Done
761	wilfart		Table 4					change "categories, and stages" to "categories and stages",	Done
762	robredo	ix	Whole page			Ge		It would be easier for the readers to have a wider list of acronyms, specially for those who are beginners. Examples: BD = Bulk Density; DM = Dry Matter; NUE = Nutrient Use Efficiency.	Agreed. Acronyms list will be provided at the beginning of the document.

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
763	grant	88-90					Rather than using a Tier 2 estimate because there is no Tier 1 (as stated in the report), the approach should be to use Tier 1 because there is no Tier 2. When I look at the explanation of Tiers 1-3 (glossary and also on p. 88-90), the runoff N and P data from the compost windrow study is actually more of a Tier 1 estimate. Also the material was dairy manure compost when in fact it was beef feedlot manure compost.		Accept. The sentence has been deleted.
764	grant	8		3.3		Ge	Definitions	Include a definition of Spool (stock changes of the pool) somewhere in this page	Accept. Below equation 1 Spool is explained as "[...] and S_pool being the stock changes of the pool (generally also regarded as 'useful' output (Leip et al., 2011b))."
765	grant	16		4.2.2.7		te	Should there be more of P in this section (particularly paragraph 1)?		Decline. P is described in this paragraph.

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
766	grant					GE	<p>This report is an interesting collection of ideas and references for monitoring nutrient flows. However, the methodologies vary significantly in purpose and scale, which impacts the applications for which they should be used. In other words, it is very difficult to evaluate the appropriateness of these methods without more information about how and where these methods will be used and for what purpose. For example, if the objective is to estimate N or P balance for a land area or farm scale, internal transformations of N and P do not necessarily need to be considered.</p> <p>Furthermore, nutrient flows and transformations are highly dependent on a wide range of factors that vary substantially with location and time. Therefore, many of the literature references that are focused on results of local research are not appropriate to generate</p>		Agreed. A sentence is added in section 3.1: Approaches used will depend on the scope, system boundary, scale and site characteristics
767	grant	v				ge	Wording	Replace "because" with "that"	Done. Thank you

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
768	grant	xi				225	wording	THROUGHOUT THE DOCUMENT – subscripts aren't consistent. For example; under Acidification – I think NOx and SOx should be be NOx and SOx. A universal search and replace should fix that. Ammonification: change to “in which a nitrogen containing”, and “Thus, the process of deamination”	Done
769	grant	xii				ge	Wording - Annual plants –this definition should not be restricted to “forage”; Feed grain or fodder root crops should be included here.	Change “forage to “crops” or “forage and other feed crops”	Done
770	grant	xii				ge	Wording – “by-product” definition	To help distinguish from “residue”, suggest clarifying that the by-product has value	Done
771	grant	xiii				ge	Inconsistent subscripts (Characterization)	Use a universal search-and-replace to change CO2 to CO2	Done
772	grant	xiii				ge	Wording (Circularity)	Delete second “that” in first line	Done
773	grant	xiii				ge	Alignment of “Compound feed/ concentrate”	Align with top of definition	Done
774	grant	xix					Wording (Inactive nitrogen)	“requires a considerable” Delete “By way of analogy” – that's not an analogy.	Done
775	grant	xv				Te ge	Denitrification does not produce ammonia wording	...and then to nitrous oxide and dinitrogen gas “is lost to the atmosphere”	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
776	grant	xvi				ge	Unclear wording (Emission intensity)	This statement is unclear: "It serves as an indicator suitable to measure the decoupling of economic growth and GHG emissions. In analogy, emission intensity or more generally flow intensity is used here to describe the flow of reactive N (Nr) caused by the production of one unit of an economic activity. This can be physical unit (e.g. kg of meat or milk)." That description seems to imply coupling between economic growth and emissions rather than decoupling. Either clarify that section or remove it altogether.	Accept. We removed the statement.
777	grant	xvii					Wording (Flux)	"Nor P" should be "N or P" "term of "fluxes" is used as synonymous of" should be "term of "fluxes" is used as a synonym of"	Done
778	grant	xviii					Wording (Footprint)	"... if the subsequent..." should be "... in the subsequent..."	Done
779	grant	xxi					Wording (Organic wastes)	Suggest "any carbon-containing wastes" and deleting "and so containing carbon"	Done
780	grant	xxi					Subscripts (Particulate matter)		Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
781	grant	xxii					Wording (Residue)	Note comment on "by-product" above; is it value that distinguishes a by-product from a residue? In Note 2: "divert materials from" may be a better term than "not to turn such materials in" Note 3: the last sentence is confusing; is it necessary?	Done
782	grant	xxvi					Wording (Volatilization)	Change to "Gaseous loss of the volatile form of a nutrient"	Done
783	grant	93		Appendix 3		te	Legumes do not fix nitrogen unless they are appropriately inoculated with the right bacteria for the legume species	Some mention should be made of this!	Done (added 'nodulated')
784	grant	xvi					Wording (Enrichment)	Change to "nutrients into different ecosystems"	Changed accordingly
785	Lathuillière	67		7.4.3		te	It is unclear what the recommendation is with respect to the circularity indicators	A statement such as "A circularity indicators from a perspective of either input (ICirc) or output (OCirc) flows may be used"	Accept. Sentence added at the end of first paragraph in section 7.4.3 "Therefore, circularity indicators from a perspective of either input (ICirc) or output (OCirc) flows may be used. "
786	Lathuillière	110			Table A8.4	ed	BW	This acronym or unit hasn't been defined, please define it	Done
787	Lathuillière	167		Case Study 3		te	Functional Unit undefined	I am guessing that it is farm production? Please clarify.	No change: Sections and table note data is for the farm or some on a per hectare basis, and this is not LCA. So, no need to specifically define a FU

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
788	Scarsbrook	13		4.2.1	Figure 3	ge	Loss flow given as "Sorption to recalcitrant P" For consistency with other boxes should there be parentheses around "P"?		Not necessary in this case
789	Scarsbrook	49			Figure 7 & Section 5.3.2 (pg. 52)	ge	The primacy given in LCIA methods to P limitation in freshwater and N limitation in marine systems is problematic for applications to the real world. Nutrient-algae interactions are highly complex. The consequences of this were shown in a real world case study by Payen & Ledgard (2017) – referenced in Case Study 1. Section 5.3.2 responds to this problem, but it provides very little guidance on the evidence needed to judge whether water bodies (marine or freshwater) are limited by one, or both nutrients.	Section 5.3.2 needs to include a statement that future development of LCIA methodology should address the complex interactions between mid-point impacts (i.e. increasing N & P) and the end-point effects (i.e. increasing primary production).	Done

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
790	Scarsbrook	60			Table 2	ge	"Tier 3: Complex model specific to a given production systems"	Delete 's' from "systems"	Done
791	Scarsbrook	60			Table 2	te	"N or P circularity" First mention of term "circularity"	Insert "(see Section 7.4.3)"	Agreed. Cross-reference to section 7.4.3 is added.

N.1	N.	page	line	Section	par	type	Comment (justification for change of technical aspects must be supported by either scientific literature or technical documents)	Proposed change (please provide alternative text)	Response
792	wilfart	Whole document				ge	<p>To a large extent, these guidelines seem to ignore current common practice in LCA methodology as found, amongst others, in reference LCI databases such as ecoinvent and AGRIBALYSE. For some subjects (such as in section 5.1.1.), these guidelines review the literature on methodological choices. We would have liked the guidelines to contain additional such reviews of the relevant literature for the major methodological choices made. Proposals made in these guidelines could then have been based on these literature findings. When the guidelines propose methods that differ from common practice, they could provide some justification.</p>	<p>Take into account literature findings and common practice when proposing methodological choices in the guidelines.</p>	<p>Thank you for this comment. The recommendations in section 5.1.1 are based on literature. More information is provided in appendix 11. For the impact assessment, we referred to most of the used methods and we provided additional information in the appendix. For the next practices, the comment is not so specific to help us address this issue properly.</p>