

AGRIBALYSE® 3.2

**FRENCH LCA DATABASE
ON AGRICULTURE AND FOOD**

AGRIBALYSE CHANGE REPORT 3.1.1/3.2

FINAL REPORT

**Nov.
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EXPERTISES

ACKNOWLEDGEMENTS

To the experts who have contributed to methodological developments and the construction of life-cycle inventories, and in particular to the members and adherents of the REVALIM Scientific Interest Group.

QUOTE FROM THIS REPORT

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SUMMARY

AGRIBALYSE 3 is a French database of life cycle inventories (LCI) for agricultural products and food consumption. It is produced as part of the AGRIBALYSE program, run since 2009 by ADEME and INRAE, with the support of numerous organizations and experts. Since 2021, AGRIBALYSE has been updated with the support and expertise of the members of the REVALIM Scientific Interest Group (ADEME, INRAE, ACTA, ACTIA).

AGRIBALYSE provides LCIs for 2,500 food products registered in CIQUAL, the national nutritional database (ANSES, 2017). Each food has a similar identification number and limits, enabling consistent links to be made between nutritional and environmental properties.

In October 2022, AGRIBALYSE 3.1 was released as the successor to AGRIBALYSE 3.0.1, followed by a corrective patch AGRIBALYSE 3.1.1 in June 2023 to correct certain specific points.

In September 2024, AGRIBALYSE 3.2 was released as the successor to AGRIBALYSE 3.1.1. This report describes the changes that have been made, leading up to the release of AGRIBALYSE 3.2.

ABSTRACT

AGRIBALYSE 3, is a French agricultural and food consumption Life cycle inventory (LCI) database. It is produced in the frame of the AGRIBALYSE program, which has been running since 2009 lead by ADEME and INRAE, with the support of numerous organizations and experts. Since 2021, AGRIBALYSE has been updated with the support and expertise of the members of the REVALIM Scientific Interest Group (ADEME, INRAE, ACTA, ACTIA).

AGRIBALYSE is providing LCIs for 2500 food items registered in CIQUAL, the national nutritional database (ANSES, 2017) , with similar ID number and boundaries, enabling consistent connections between nutritional and environmental properties.

In October 2022, AGRIBALYSE 3.1 was released after the previous AGRIBALYSE 3.0.1, followed by AGRIBALYSE 3.1.1 corrective patch in June 2023 in order to correct certain specific points.

In September 2024, AGRIBALYSE 3.2 was released. This report describes the changes that have been made leasing the release of AGRIBALYSE 3.2.

1. Introduction

The AGRIBALYSE 3.0 database was released in September 2020, and very quickly updated with version 3.0.1 including some corrections, followed by version 3.1 in October 2022 and 3.1.1 in June 2023. In September 2024, version 3.2 was released with numerous corrections and improvements, presented in this document.

The scientific documentation available on the AGRIBALYSE website is also updated.

These changes mainly involve methodological improvements within targeted data (work in conjunction with technical institutes), the addition of data, the updating of library data used in the background (Ecoinvent), and the correction of errors present in 3.1.1.

2. Evolution of the impact of AGRIBALYSE 3.2 products

AGRIBALYSE offers several spreadsheets summarizing the environmental impacts of data calculated using the EF3.1 method recommended by the Product Environmental Footprint (PEF):

- Conventional and organic agricultural data: these 2 spreadsheets show the impacts of agricultural production for 1kg product at farm gate or at orchard gate. These spreadsheets do not include agricultural data copied or adapted from Ecoinvent or WFLDB.
- Food product data: this spreadsheet shows the impact of food products "at the consumer stage", i.e. integrating the entire upstream product chain.
- Ecoalim animal feed data: this spreadsheet contains the data used to feed farm animals.

This section summarizes the changes in impacts observed between AGRIBALYSE 3.1.1 and AGRIBALYSE 3.2.

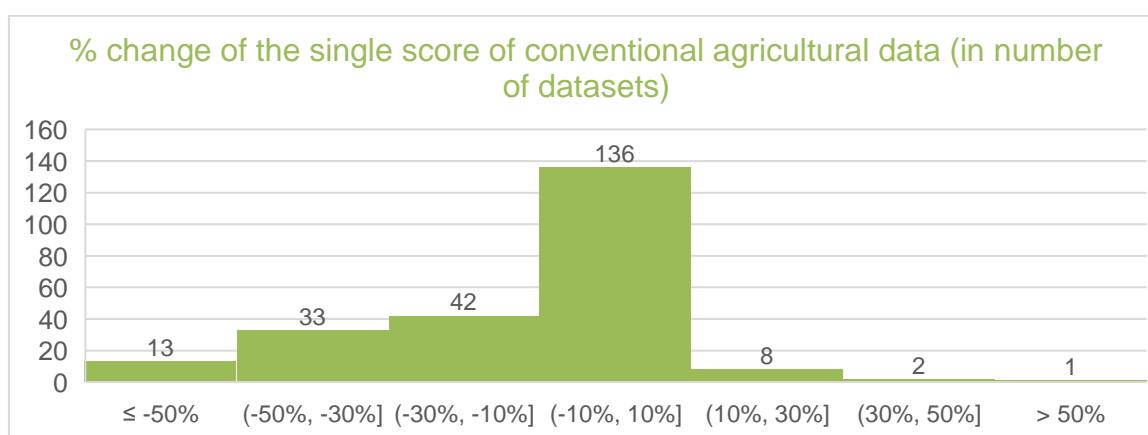
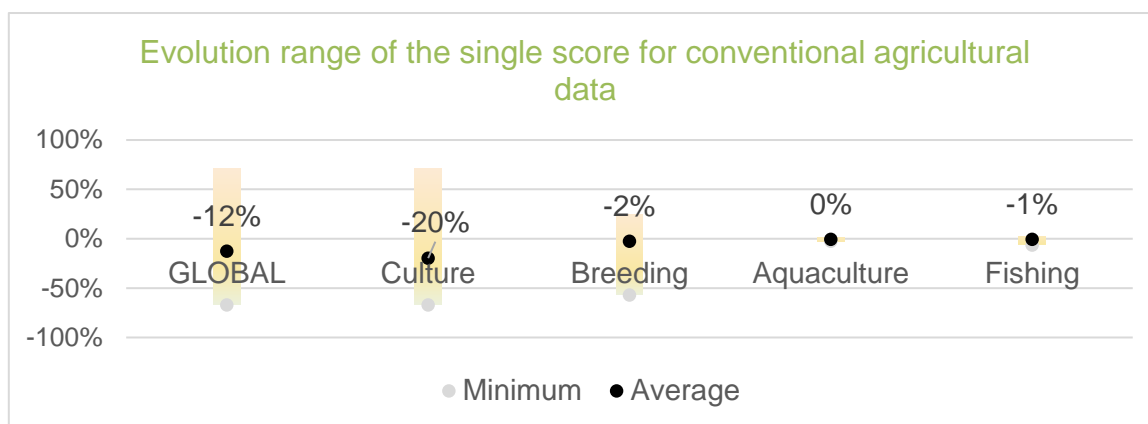
The focus is on the single score (aggregation of the 16 EF3.1 impact indicators), climate change and water use.

2.1. Changes in the impact of agricultural products

2.1.1. Conventional agricultural production

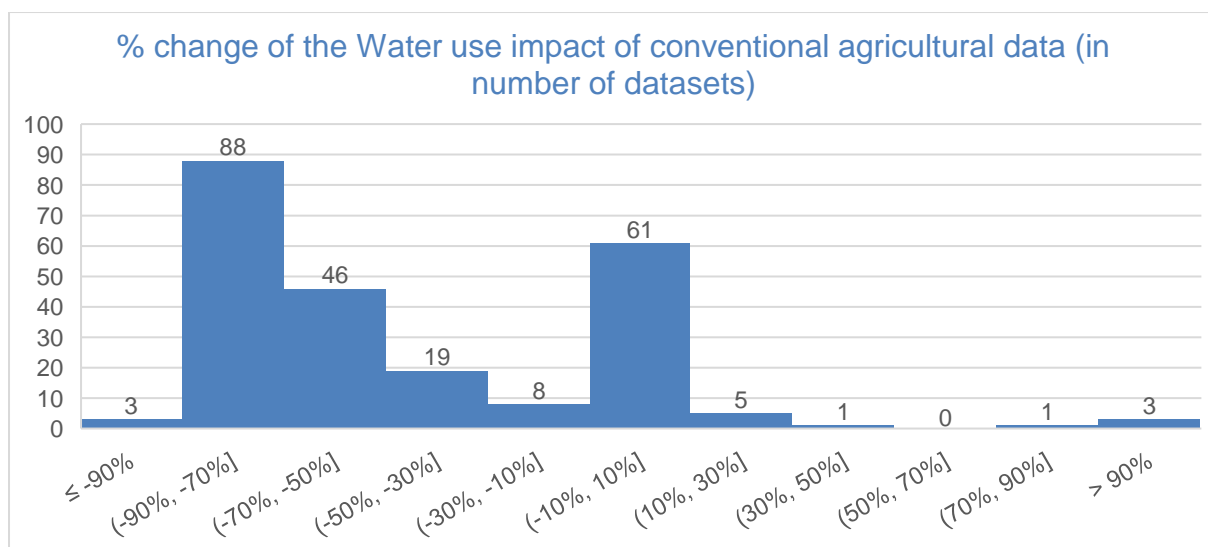
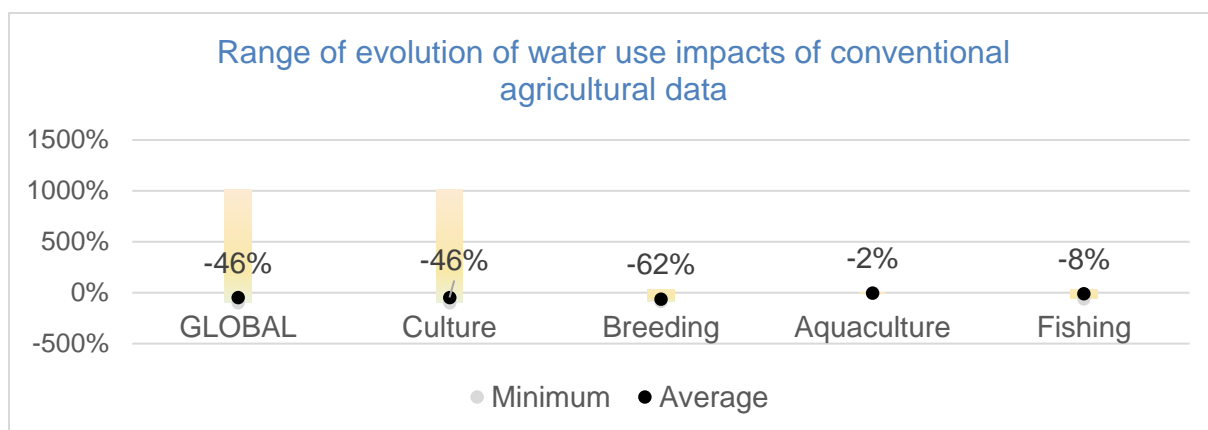
Updates to conventional agricultural production data have reduced the overall impact.

As a result, the majority of data has seen a drop in its **single score** impact (weighted aggregation of impacts on the 16 EF3.1 indicators). This drop mainly concerns crop data, and to a lesser extent livestock data.

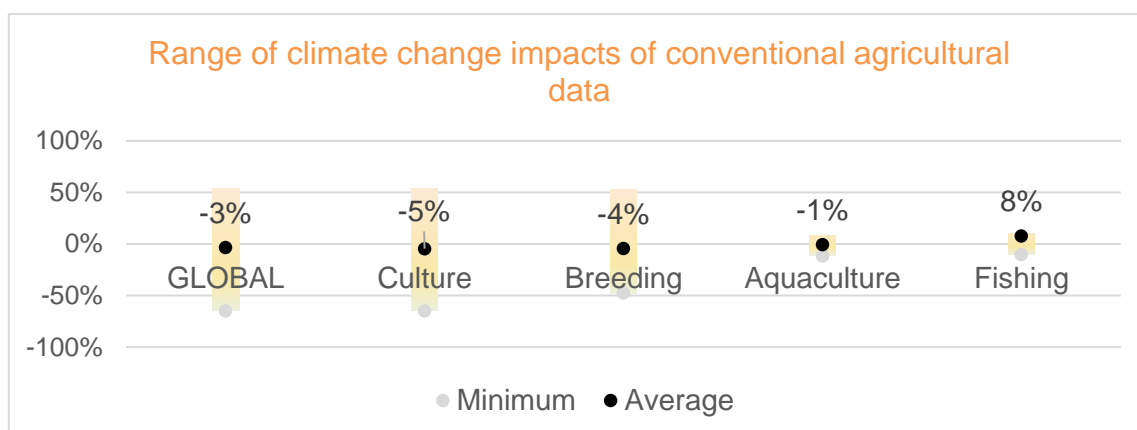


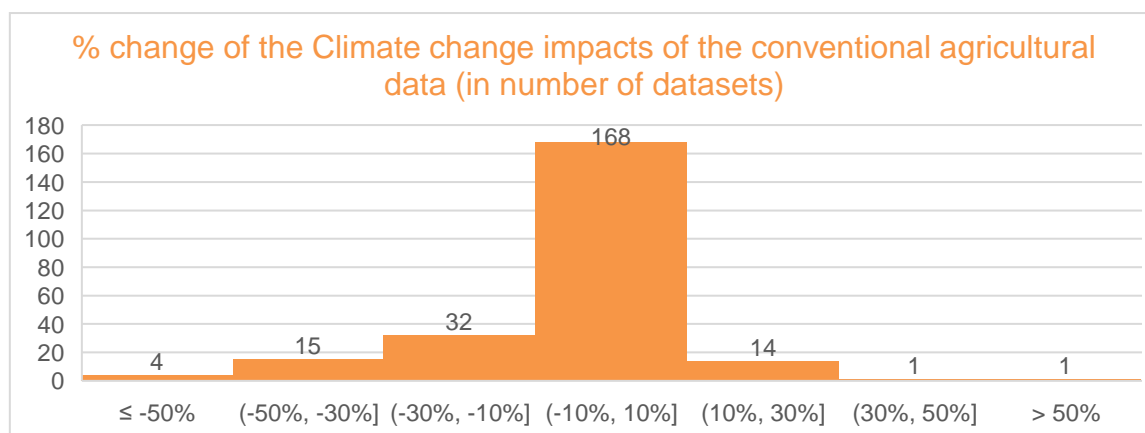
This decline was mainly due to the following factors:

- The impact on the **water depletion** indicator has been reduced overall thanks to the regionalization of flows, which were previously not regionalized. This is a methodological change that concerns the way water flows are modeled in LCA, and not a change in agricultural practices. For some data representing crops in countries with high water stress, the impact on this water depletion indicator may have increased significantly, for example for Moroccan Clementine. However, for all French crop production data (the majority of data), this has led to a decrease in impact. This explains the extreme values (particularly positive) of the evolution of the impact on this indicator. This evolution of impacts for irrigated crops is then transferred to the impacts of data representing animal husbandry, which requires certain plant productions for their feed. In the case of fisheries and aquaculture data, the changes are less marked, and are due more to the updating of background data.



- Overall, there has been little change in the impact of **climate change** data. For livestock farming, the updating of several data thanks to the InCyVie batch 1 project, which updates farming practices with more recent data, has led to a reduction in the impact for several productions, particularly poultry.

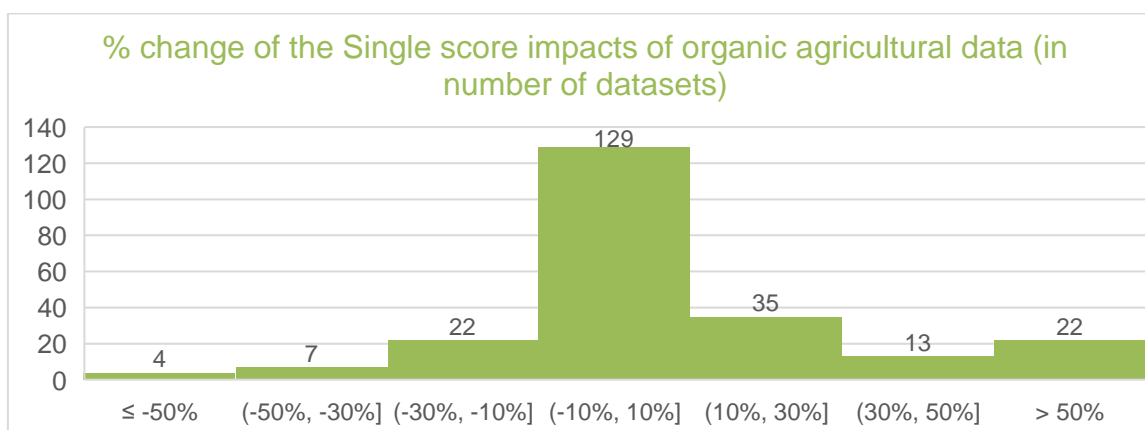
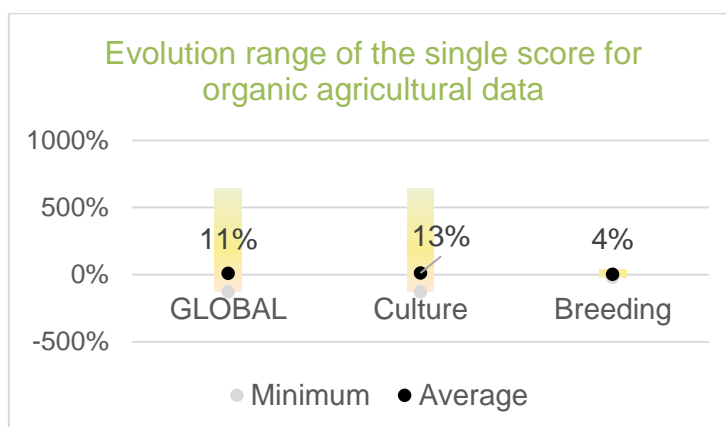




2.1.2. Organic agricultural production

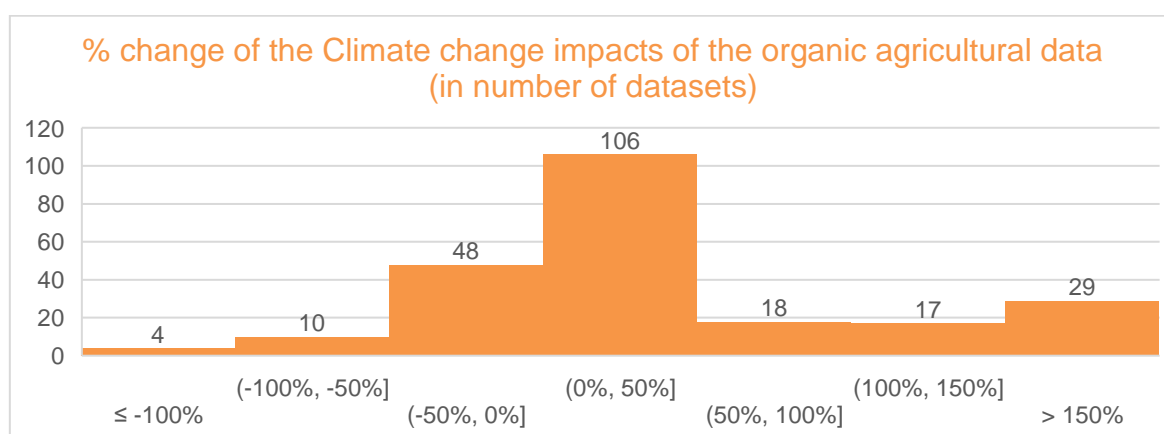
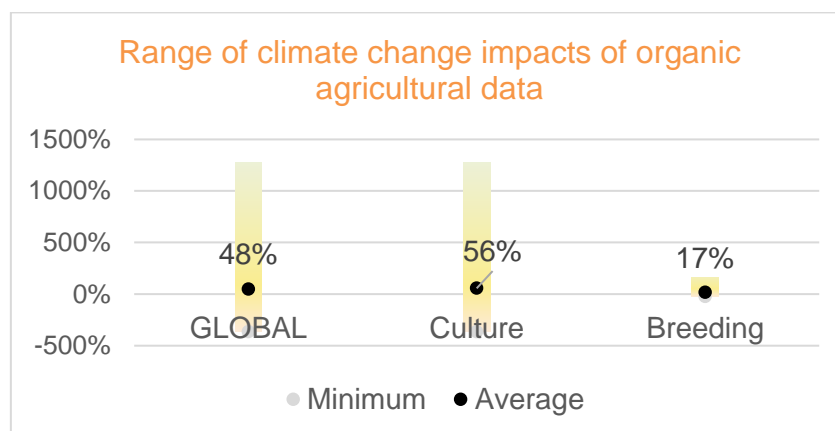
Updates to organic agricultural production data have led to an overall increase in impacts.

On average, the **single score** for organic production data increased by around 11%. This increase is mainly due to a sharp rise for some crop data, with the majority of data seeing their impact evolve between -10 and +10%.



- The average impact of data on **climate change** has increased following a methodological update on the inclusion of organic fertilizer impacts in AGRIBALYSE (see dedicated paragraph)

in this document). The inclusion of the impact of organic fertilizers, which was not the case in the previous version of AGRIBALYSE, has led to an increase in the impact mainly for crop production data, and to a lesser extent for livestock production data. Some high impact variations also concern feed data for livestock, for which a correction has been made to the allocation of impacts between co-products.



- The impact of data on the **Water use indicator** follows broadly the same pattern. The regionalization of irrigation flows has also been updated. For certain inventories, the decrease in this potential impact is mitigated by the updated methodology for taking into account the impact of organic fertilizers.

Clarification of the increased impact on the Water use indicator for certain LCIs:

Some agricultural inventories show a high rate of change in the impact of Water use between Agribalyse version® 3.1.1 and version 3.2. For some, this high rate of change may be due to the Organic Waste Products update carried out for version 3.2. In fact, in Agribalyse® 3.1.1, these inventories called for empty Organic Waste Product (OWP) inventories (known as "dummy" inventories). There was therefore no impact linked to the production/processing of these OWPs. The OWP update in Agribalyse® 3.2 allows the impact of OWP processing to be taken into account in each agricultural production inventory concerned.

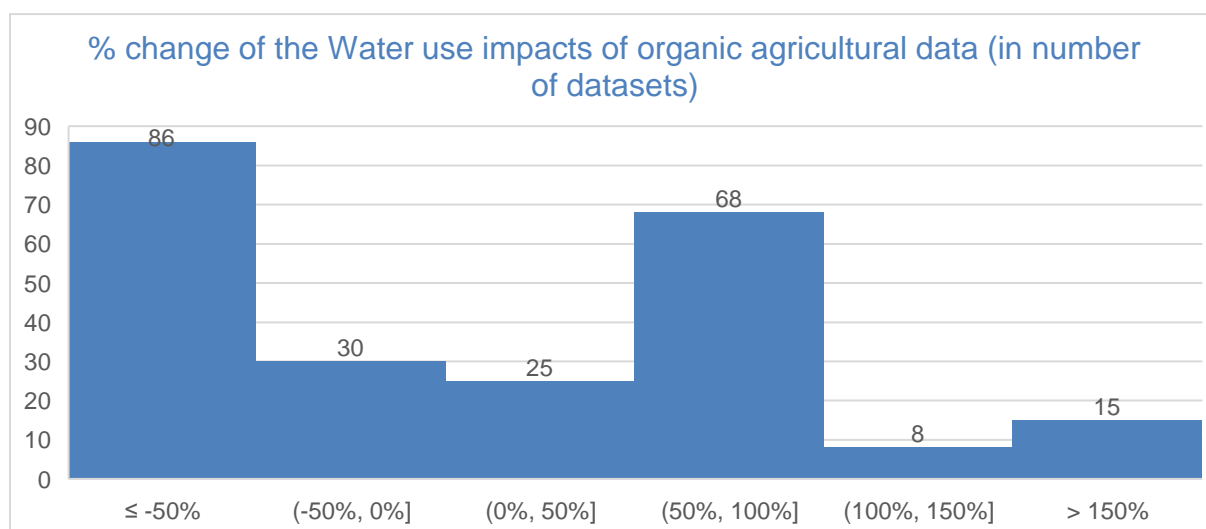
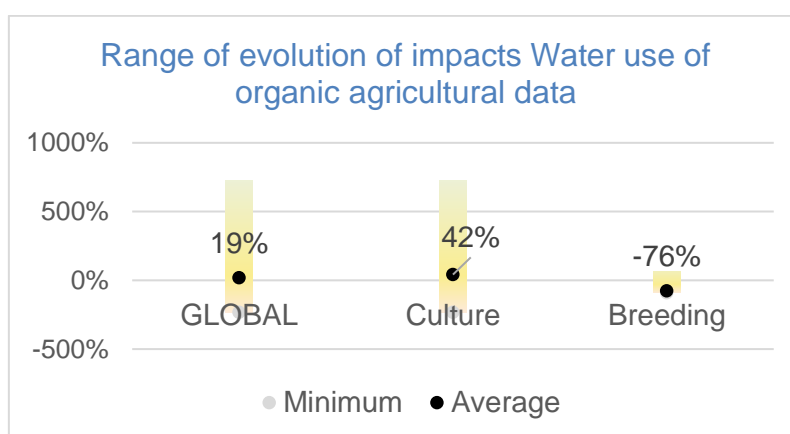
For these agricultural production inventories, the impact on Water use remains low in version 3.2, but their values in version 3.1 were close to zero, which explains the high evolution rate. As the evolution rate is calculated as the ratio of the difference between the arrival value and the departure value to the departure value, it is logical to observe a very high result when the denominator (departure value) is close to zero.

To illustrate, let's take the inventory "Winter wheat, organic, system number 8, at farm gate {FR} U" :

Its impact on Water use increased by 437% between Agribalyse® 3.1.1 and Agribalyse® 3.2. For this indicator, the starting value (AGB 3.1.1) was 0.00463 m3 depriv./kg and its current value (AGB 3.2) is 0.0249 m3 depriv./kg. This increase is due to the inclusion of organic fertilizer average granulate packaged, which accounts for 66% of the impact on water.

To contextualize the value of this impact, we can observe that the average value of this indicator for organic production in version AGB 3.2 is 0.431 m3 depriv./kg of product.

In conclusion, when a significant rate of change is observed, it is important to return to the analysis of impact values to understand whether this rate of change highlights a point of attention to be considered.



2.2. Changes in the impact of food products

With the AGRIBALYSE 3.2 update, **the single score** for food products has increased by an average of +4%

This evolution is particularly marked by two transversal updates, which have contrasting influences depending on the product:

- **The regionalization of water flows** in LCA modeling, which notably affects French agricultural production upstream of food products, but also downstream processing stages, resulting in an overall reduction in impacts on this indicator.

- **Updated packaging** for all food products. This update has led to both lower and higher impacts, depending on the product.

In addition, numerous one-off updates to correct or improve certain data also cause variations in impact of varying degrees, and are detailed in the rest of the report.

By product category, the main changes in impact observed are :

Table 1: Main changes in the impact of AGRIBALYSE 3.2 food products

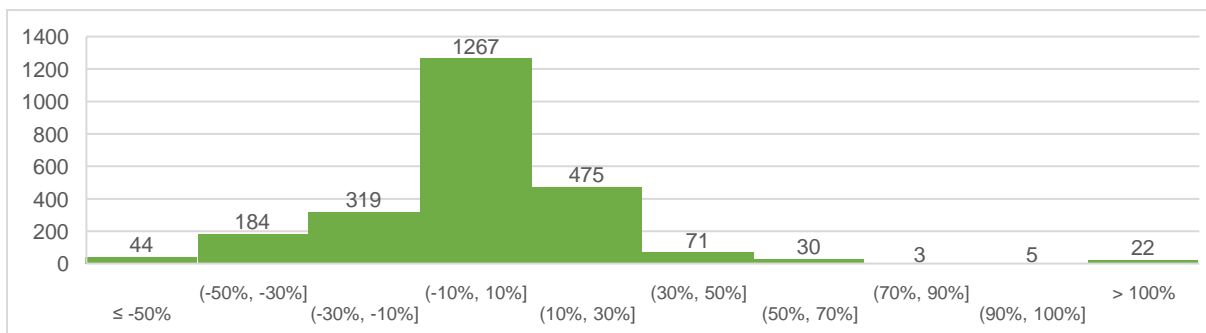
Food product category	Impact trends observed
<ul style="list-style-type: none"> - Ice creams and sorbets, - Oils and fats, - Culinary aids and various ingredients, - Starters and mixed dishes, - Sweet products, - Cereal products, - Beverages 	<p>Average increase in Single Score and Climate Change impacts due to product packaging specifications. For these categories, packaging will account for a larger share of the final product's impact, compared to AGRIBALYSE 3.1. This is particularly true for glass-packed products (beverages) and small-format products (spices).</p> <p>For certain spices (those approximated by pepper for the agricultural stage), a drop in the single score impact is observed following the drop in the ecotoxicity impact linked to the updating of a background data on fertilizers.</p> <p>For sweet and cereal products: variations in various impacts, notably with the updating of several recipes for sweet products, which is also reflected in cereal products.</p>
<ul style="list-style-type: none"> - Fruits, vegetables, pulses and oilseeds 	<p>In this category, the updated regionalization of water flows has particularly reduced the impact on the Water use, and consequently the single score, even though the impact on climate change has increased on average.</p> <p>Some data have been updated for the agricultural stage, resulting in lower impacts (peach) or reduced impacts (apricot).</p> <p>For several products, the updating/harmonization of the ratios of edible/non-edible parts may have led to an increase or decrease in impacts.</p> <p>A very high increase in impact is observed for a product linked to the updating of the data used to represent agricultural production, which was previously an approximation (morel).</p>
<ul style="list-style-type: none"> - Baby food 	<p>For this category, single scores are down on average, following an update of infant product recipes for AGRIBALYSE 3.2 and the updating of data representing milk powders. On the other hand, the impact on climate change increases for certain products following the specification of packaging.</p>
<ul style="list-style-type: none"> - Meat, eggs, fish, milk and dairy products 	<p>Impacts on Water use are down on average, particularly for livestock products, as a result of the reduced impact of crop production on this indicator.</p> <p>The impacts on climate change and the single score are on average up, with some products having been significantly updated:</p>

	<ul style="list-style-type: none"> - Duck products: significant changes, mostly in the direction of an increase, following the updating of rearing and slaughtering data (particularly allocations), which were previously approximations - Pork products: updates on rearing and slaughtering stages and on recipes, resulting in increased or reduced impacts depending on the product. - Poultry products (meat and eggs), whose impact has been reduced. - Lastly, for veal-based products, updating feed data (particularly milk powders) on average results in an increase in impacts. <p>For fish, the overall impact has increased thanks to updated packaging and better consideration of the impact of packaging materials.</p> <p>It should be noted that for shrimp-based products, the ratios of edible/non-edible parts have been harmonized, resulting in lower or higher impacts depending on the product.</p>
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Table 2: Percentage changes in the impact of AGRIBALYSE 3.2 food products on the single score, climate change and Water use.

Food category	SINGLE SCORE			CLIMATE CHANGE			ATER RESOURCE DEPLETION		
	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum
All categories	-80%	4%	1652%	-81%	10%	1204%	-94%	-32%	1526%
Culinary aids and miscellaneous ingredients	-55%	9%	137%	-62%	29%	280%	-89%	-10%	883%
Baby food	-52%	-12%	35%	-63%	11%	133%	-89%	-33%	337%
Beverages	-70%	2%	391%	-81%	10%	96%	-87%	-12%	123%
Starters and mixed dishes	-80%	9%	384%	-80%	10%	223%	-88%	-34%	389%
Fruits, vegetables, pulses and oilseeds	-66%	-1%	930%	-55%	12%	1150%	-94%	-36%	1526%
Ice creams and sorbets	0%	16%	37%	-6%	20%	70%	-48%	-19%	53%
Milk and dairy products	-43%	4%	22%	-54%	6%	45%	-82%	-43%	225%
Fats and oils	-16%	10%	61%	-17%	24%	96%	-72%	-24%	102%
Cereal products	-63%	-2%	150%	-47%	8%	75%	-89%	-36%	773%
Sweet products	-49%	7%	32%	-22%	11%	68%	-83%	-13%	278%
Meat, eggs, fish	-63%	7%	1652%	-54%	5%	1204%	-83%	-33%	629%

Figure 1: Number of food products by AGRIBALYSE 3.2 single score evolution range



i Figure 2: Number of food products by range of climate change impact AGRIBALYSE 3.2

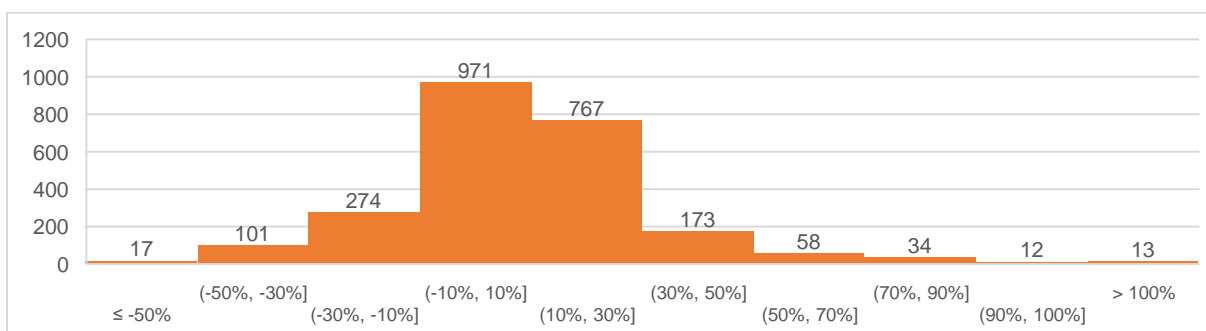
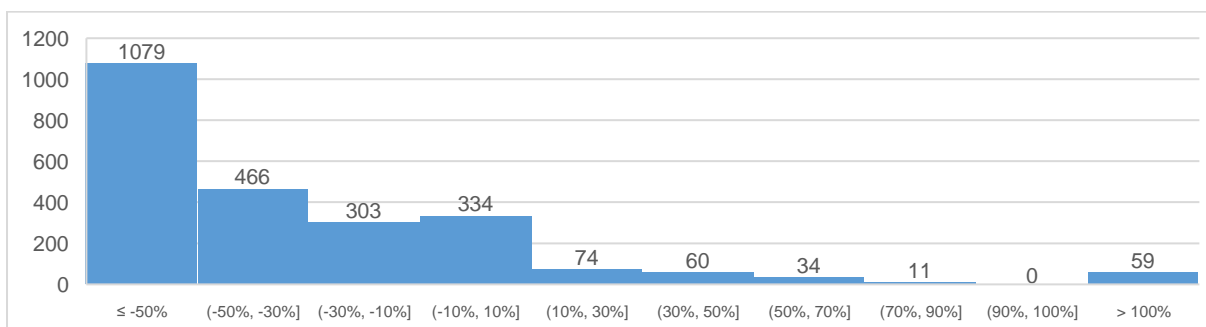
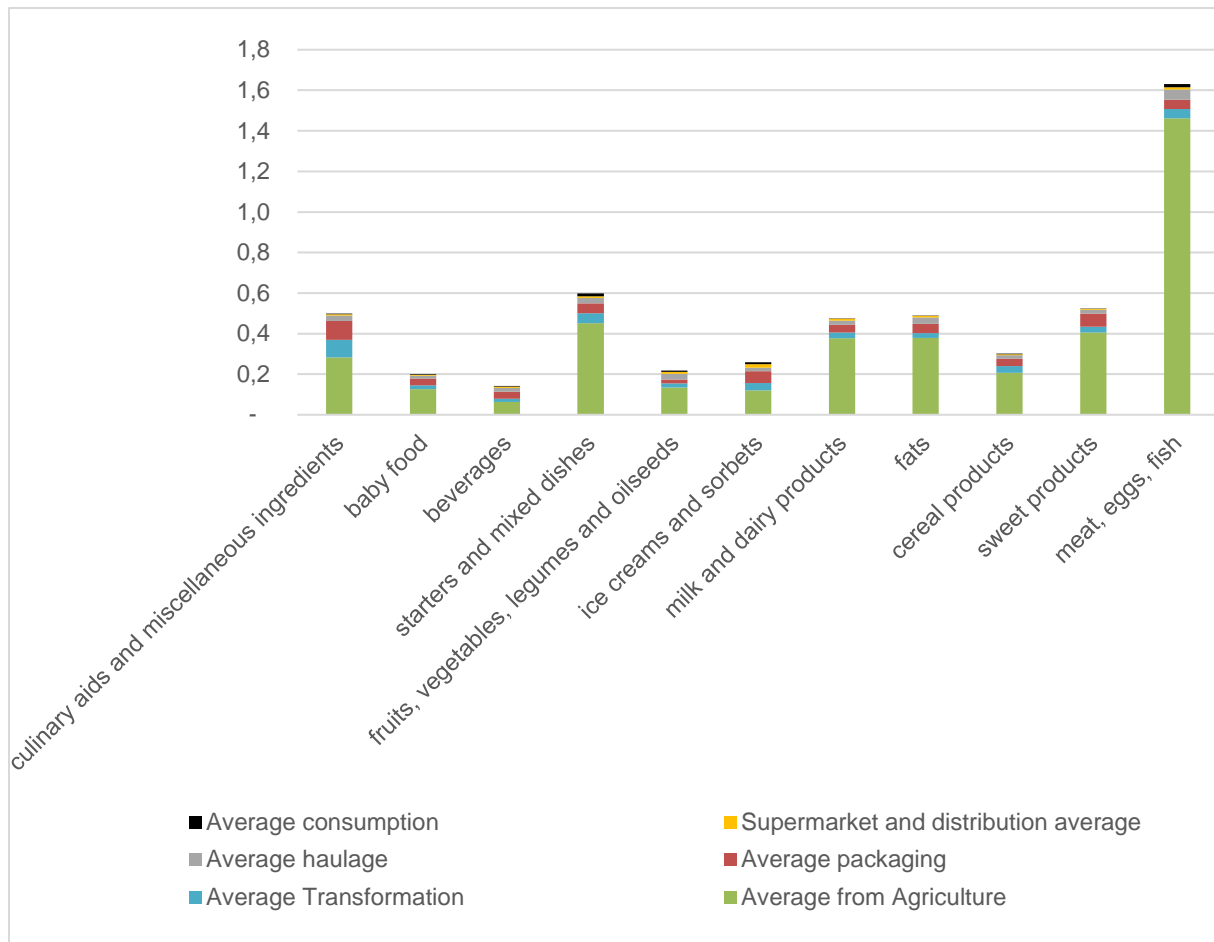


Figure 3: Number of food products by AGRIBALYSE 3.2 water depletion impact evolution band



Overall, the average impact profile of Agribalyse 3.2 products on the single EF3.1 score is summarized in Figure 4

Figure 4 : Average single score for Agribalyse 3.2 products by life cycle stage and product category (mPt/kg at consumer step)



3. Cross-functional updates to the database

Some updates are cross-functional, covering both agricultural and food products.

The main cross-functional updates are as follows:

- Background data update (Ecoinvent)
- Improved packaging for all food products
- Changes in the way organic waste products (OWP) are taken into account
- Regionalization of water flows.

These developments are described below.

3.1. Update background data

Data copied from other databases and used in the AGRIBALYSE background have been updated:

- **Ecoinvent 3.8 data have been updated to Ecoinvent 3.9.1** - some data copied from Ecoinvent 3.8 have therefore become obsolete, replaced by new versions.
- Some of the data in Ecoinvent 3.9.1 contain errors identified by Ecoinvent, and have therefore been modified. This applies in particular to the following data sets:

- **Wastewater:** some wastewater treatment data in Ecoinvent 3.9.1 showed erroneous (too high) water discharges to water, resulting in negative impacts on water depletion indicators. In these data copied from Ecoinvent 3.9.1, the values were corrected with those corresponding to Ecoinvent version 3.10, in which these errors were corrected. The adapted inventories and corrected flows inside are tagged as such in the AGRIBALYSE 3.2 version available in the LCA software.
- **Rice:** agricultural production data for Indian rice in Ecoinvent 3.9.1 contained too much irrigation water, resulting in very high impacts of rice products on the water depletion indicator. In these data copied from Ecoinvent 3.9.1, the values were corrected with those corresponding to Ecoinvent version 3.10, in which these errors were corrected. Adapted inventories and corrected flows are tagged as such in the AGRIBALYSE 3.2 database available in LCA software.
- **Lentils:** data for lentil production in Canada used an erroneous land use transformation flow, which had a negative impact on the Land Use indicator. This flow has been corrected in line with Ecoinvent recommendations. Adapted inventories and corrected internal flows are tagged as such in the AGRIBALYSE 3.2 database available in LCA software.
- **Brazilian soybeans:** Ecoinvent 3.9.1's Brazilian soybean agricultural production data contained errors in 2 areas:
 - **Water consumed for pesticide dilution:** Ecoinvent 3.9.1 data for Brazilian soybean agricultural production showed too much water for pesticide dilution (water consumption and water emissions into the air). In these data copied from Ecoinvent 3.9.1, the values were corrected with those corresponding to Ecoinvent version 3.10, in which these errors were corrected. Adapted inventories and corrected flows are tagged as such in the AGRIBALYSE 3.2 database available in LCA software.
 - **Pesticide emissions for the Brazilian soybean inventory in the Goias region (BR-GO):** Ecoinvent 3.9.1's data on agricultural production of Brazilian soybeans in the GOIAS region overestimated the amount of pesticide (Chlorpyrifos) emitted into the air, water and soil by a factor of around 100. This overestimation resulted in an excess impact on the ecotoxicity and human toxicity indicators, and on the single score, with repercussions for data using soy. These emissions were corrected with the correct values recommended by Ecoinvent. Adapted inventories and internally corrected flows are tagged as such in the AGRIBALYSE 3.2 database available in LCA software.
- **WFLDB 3.5 data have not been updated, but the background of** these data has been modified (using Ecoinvent 3.9.1 data instead of Ecoinvent 3.5 data, for consistency).

3.2. Improving food packaging

All food packaging has been updated in AGRIBALYSE 3.2.

Until the previous version of AGRIBALYSE 3.1.1, packaging was modeled in a simplified way:

- Only the primary packaging was modeled
- Only the heaviest packaging material was modeled
- Weights and material types were determined by product category.

For AGRIBALYSE 3.2, the PACK-AGB project made it possible to create product-specific packaging typologies for around 50% of the products in the database, specifying all the materials and processes used to shape primary, secondary and tertiary packaging, as well as their end-of-life, using the PEF Circular Footprint Formula.

For the remaining 50% of products, approximations were made by selecting a similar packaging system.

The PACK-AGB project methodology is described in more detail in two specific documentation reports: one for the 50% of products covered by the PACK-AGB project and the other for the remaining 50% .

This improvement can generate significant changes in impact: for example, an increase in the impact of packaging is noticeable for products packaged in small formats or in glass, such as spices, drinks, etc.

3.3. Changes in the way organic waste products are taken into account

3.3.1. Context

GIS REVALIM has conducted a study on the inclusion of organic waste products (OWPs) in LCA, as applied to AGRIBALYSE. This study¹ identified and tested four main types of methods:

- Cut-off approach to impacts on the processing chain: Upstream burden cut-off, Downstream burden cut-off, Post-storage cut-off, Economic cut-off,
- Multifunctionality management approach: Economic allocation, Mass allocation
- Approach to distributing impacts in circular economy loops: Application of the Circular Footprint formula (JRC)² and a simplified version
- Substitution approach

The analyses carried out in the study, together with feedback from the public consultation (end 2023), highlighted a number of factors that guided the choice of approach.

It seems important to allocate environmental impacts as closely as possible to the reality of the organic waste product processing chain: the sharing of impacts between the producer of the residual material (RM) and the user of the OWP must be carried out as finely as possible. A method of the intermediate cut-off type (e.g.: economic cut-off) would make it possible to approach a more coherent impact sharing.

In view of the wide variety of economic data available, depending on the area and organic waste product studied, and in a time-constrained context, the GIS REVALIM OWP working group decided to dispense with the need for economic data by adopting an approach that did not require this type of data.

3.3.2. Approach adopted

The methodological proposal aims to meet the following criteria:

- consistency with methodological guidelines,

¹ A. Moreno, M. Chartier Kastler, M. Kiener, C. Dizien, M. Cornélus, S. Rullier, L. Nitschelm, 2024. Prise en compte des produits résiduels organiques (PRO) en ACV : Application à AGRIBALYSE. 149 pages.

² EC 2018, pp.110-130 ; Zampori & Pant 2019, pp.65-75

- scientific accuracy and relevance,
- technical feasibility of integration into AGRIBALYSE, depending on variability and additional data requirements.

GIS REVALIM has adopted the **intermediate cut-off** approach along the chain. The intermediate cut-off determines the boundary between waste treatment and its recovery in ORP.

In order to locate where this boundary lies on a waste material processing line, we need to identify the "tipping" process. The following question will help identify it:

"On average in France, at what stage is the material spread?"*

*N.B.: the process in question must allow a change of state or composition. For example, the tipping process cannot be a transport stage.

3.3.3. Overall assessment of inventories built or modified

3.3.3.1.1. Methodological update

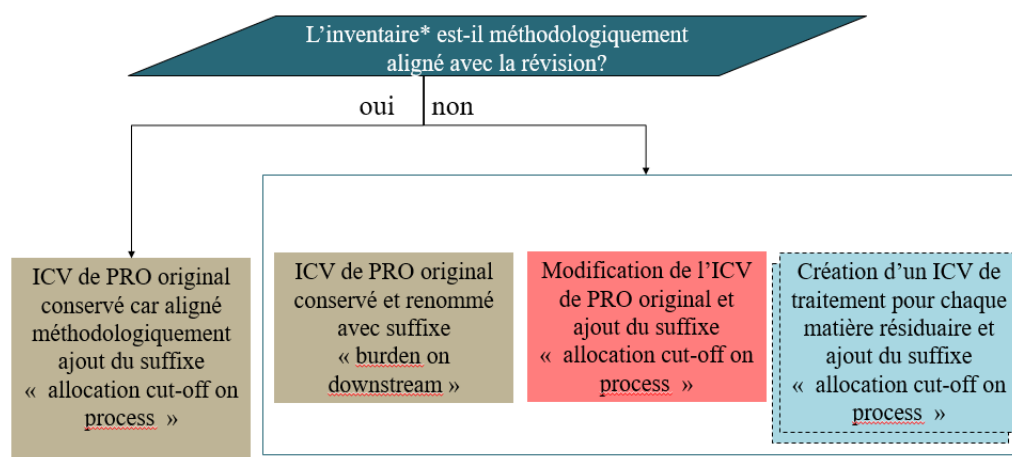
In AGRIBALYSE version 3.1.1, organic waste product (OWP) inventories are based on work carried out as part of the "ICV Mafor" project³⁴. The work carried out by GIS REVALIM has led to a revision of the impact allocation method and thus to an update of the ORP inventories. All Mafor LCIs (110 LCIs) were analyzed to check their methodological alignment with the new proposal. Figure 5 explains the work carried out on inventories from AGRIBALYSE version 3.1.1:

- If the inventory is aligned with the new proposal, its content remains unchanged, but it now carries the suffix "allocation cut-off on process" in its name.
- If the inventory is not aligned with the new methodology, its content is modified and it is given the suffix "allocation cut-off on process" in its name. A waste treatment inventory is also created (no impact disappearance). The original inventory is kept in order to leave open the possibility of using other approaches that suit specific research or project objectives. This original inventory is stored in the software architecture under the "burden on downstream" folder and carries this suffix in its name.

Figure 5 : Work based on the original OWP LCIs from AGRIBALYSE 3.1.1

³ Angel Avadi, "Screening LCA of French Organic Amendments and Fertilisers," *The International Journal of Life Cycle Assessment* 25, n° 4 (April 2020): 698-718, <https://doi.org/10.1007/s11367-020-01732-w>.

⁴ Angel Avadi and J.M. Paillat, "Dataset of organic fertilizers' characteristics - French data" (CIRAD Dataverse, V2, 2020), <https://doi.org/10.18167/DVN1/OYD9WF>.



*ICV de PRO original (Projet ICV Mafor, AGB 3.1)

See the complete list of LCIs at Appendix 2

Table 3: Number and status of waste treatment (MR) and organic waste product (OWP) production inventories (LCI) for AGRIBALYSE 3.2

	Number of OWP inventories in AGRIBALYSE 3.1.1	New inventories created, allocation cut-off on process" suffix	Modified inventories , "allocation cut-off on process" suffix	Original aligned inventories *, suffix "allocation cut-off on process".	Original unaligned* inventories preserved, suffix "burden on downstream".	Process inventories , "allocation cut-off on process" suffix	Number of OWP inventories in AGRIBALYSE 3.2
Compost	10	3	8	2	8	9	30
Digestates	26	0	2	24	2	1	29
Livestock effluents	18	8	2	16	0	0	26
Fertilizers and organic soil improvers	25	0	0	25	0	0	25
Other	4	0	0	4	0	0	4
Sewage sludge	29	0	27	2	10	2	41
Total	112						155

There are 4 organic waste categories whose inventories have been modified to bring them into line with the new proposed impact attribution methodology (blue figures in the table above). These 3 categories are :

- Compost (8 modified inventories) ;
- Digestates (2 modified inventories) ;

- Livestock effluents (2 modified inventories) ;
- Sludge (27 modified inventories).

Some of these inventories have been modified in terms of water flow in order to propose a correct water balance (see paragraph below).

3.3.3.1.2. Correction of water balance inventories

Some of the updated inventories have been corrected for water flows, hence the name "water balanced".

This correction concerns :

- 2 effluent category inventories
- 15 of the 27 modified sludge inventories

In these corrected inventories, a parameter is used to balance the water balance. Previously, the original "processing level" inventories took input water into account when calculating the mass balance, but the flow called for the input (sludge) was an empty process, so no incoming water flow was accounted for by the characterization method, hence the calculation of a positive balance (water flow created).

Please refer to the full report: .

3.4. Regionalization of water flows

The water depletion indicator used for AGRIBALYSE (AWARE method used in Environmental Footprint 3.1) is regionalized. In order to improve the accuracy of the impacts calculated on this indicator, the regionalization of the water flows used in the inventory data of the AGRIBALYSE database has been specified.

3.4.1. Irrigation and watering flows in agricultural data

For agricultural inventory data produced by AGRIBALYSE partners (not including data copied or adapted from Ecoinvent and WFLDB), i.e. the vast majority of French production, the following flows have been regionalized according to the country of production:

- Crop irrigation flows
- Livestock watering flows

Previously, these flows were not regionalized ("water, river") and therefore used a rather high generic characterization factor. They are now regionalized ("water, river, ID").

This concerns both water withdrawal and emission flows.

For production inventories in France, the impact on water is significantly lower, as the characterization factor for France is lower than the generic one.

For production inventories in other countries, the opposite may occur (e.g. Morocco for mandarins or Spain for strawberries).

3.4.2. Water flows used in transformation and downstream processes

Water consumption in food processing operations carried out in France has also been regionalized, by adapting Ecoinvent tap water data to represent water abstracted in France rather than European average. The same applies to wastewater treatment data.

These data, adapted from Ecoinvent, could also be used in the downstream stages of agri-food products, i.e. the distribution center, retail (supermarket) and consumer stages.

4. Upstream agricultural data update

4.1. Add or update inventories and technical farming itineraries

4.1.1. Agricultural inventories added or updated as part of the InCyVie project lot 1

As part of the InCyVie batch 1 project, several inventories have been updated or added.

These developments are described in the dedicated methodological report .

In addition, the following 2 data sets have been created (composed of 97% fattened pigs + 3% cull sows):

- Mixt pig, Label Rouge, national average, at farm gate {FR} U
- Mixt pig, organic, national average, at farm gate {FR} U

All updates are described in Table 4

Table 4 : List of agricultural inventories updated or added as part of the Incyvie lot 1 project

Material	Inventory name	Evolution	Institute
Apricot France	Apricot, conventional, national average, at orchard {FR} U	New	CTIFL
Fishing France	Peach, conventional, national average, at orchard {FR} U	Update	CTIFL
Endive France	Chicory witloof, conventional, national average at farm gate {FR} U	Update	CTIFL
Label Rouge pork	Pig, Label Rouge, national average, at farm gate {FR} U Composed of 50% Pig, Label Rouge, outdoor system, at farm gate {FR} U 50% Pig, Label Rouge, pig with run system, at farm gate {FR} U	Update	IFIP
Organic pork	Pig, organic, national average, at farm gate {FR} U Composed of 50% Pig, organic, indoor system, at farm gate {FR} U 50% Pig, organic, outdoor system, at farm gate {FR} U	Update	IFIP
Conventional pork	Pig, conventional, national average, at farm gate {FR} U And Cull sow, conventional, national average, at farm gate {FR} U	Update	IFIP

Pork slaughtering	Pork, meat without bone, for processing, at slaughterhouse gate {FR} U And all co-products of pork slaughtering	Update	IFIP
Conventional chicken	Broiler, conventional, at farm gate {FR} U	Update	ITAVI
Label rouge chicken	Broiler, Label Rouge, at farm gate {FR} U	Update	ITAVI
Egg	Egg, conventional, indoor system, cage, at farm gate {FR} U Egg, conventional, indoor system, non-cage, at farm gate {FR} U Egg, conventional, outdoor system, at farm gate {FR} U	Update	ITAVI
Lean duck	Duck for roasting, conventional, at farm gate {FR} U	Update	ITAVI
Fattened duck	Fattening duck, conventional, at farm gate {FR} U	Update	ITAVI
Duck slaughtering	Fattened duck, liver, for processing, at slaughterhouse gate {FR} U	New	CTCPA

4.1.2. Addition of two soy cut-off dates datasets

The European Union's (EU) deforestation policy refers to a set of regulations and initiatives aimed at reducing deforestation and forest degradation, both within the EU and on a global scale. A cut-off date is a specific date set by the regulation, after which land conversion (e.g. deforestation or forest degradation) for the production of certain commodities must not have taken place if these products are to be sold on the EU market. The cut-off date could apply to the main commodities associated with deforestation, including soy, palm oil, beef, timber, cocoa and coffee, among others. In the AGRIBALYSE 3.2 version, work focused solely on soy production.

Two new soybean inventories have been adapted from ecoinvent data for AGRIBALYSE 3.2:

- Soybean, cut off date 2008 {BR}| market for soybean, without transport | Cut-off, U - Adapted from Ecoinvent
- Soybean, cut off date 2020 {BR}| market for soybean, without transport | Cut-off, U - Adapted from Ecoinvent

These inventories refer to 1 kg of soy with a cut-off date of January 1, 2008 or January 1, 2021. To be able to call up these inventories, soybeans must not have been produced on deforested land after January 1, 2008 or January 1, 2021 respectively.

The period prior to the cut-off date ({2005 to 2007} or resp. {2005 to 2020}) is not the subject of traced and reliable soy production information, so the average production mix of Brazilian soy imported to France is called "Soybean, not associated to deforestation {BR}| market for BR soybean imported to France, without transport | Cut-off, U - Adapted from Ecoinvent".

For the period between the cut-off date and today (i.e. {2008 to 2024} or {2021 to 2024}), Brazilian soybean production is considered non-deforesting "Soybean, not associated to deforestation {BR} market for BR soybean imported to France, without transport | Cut-off, U - Adapted from Ecoinvent".

The 20-year threshold is based on the time needed for the stored carbon to reach equilibrium (often 20 years in the IPCC default methods).

4.1.3. Updating national production mixes

Raw material	Inventory	Changes made
Beef and veal	Beef cattle, conventional, national average, at farm gate {FR} U	Organic production no longer included in the mix. It now contains only conventional production. The figures representing the share of each type of production have been updated: for example, the share of dairy cull meat has risen from 38% to 41%, and the share of suckler systems from 62% to 59%. These figures have been updated with data from IDELE . At the same time, a mix representing organic beef has also been created using distribution figures from the same source.
Cow's milk	Cow milk, conventional, national average, at farm gate {FR} U	Organic production no longer included in the mix. It now contains only conventional production.
Eggs	Egg, conventional, national average, at farm gate {FR} U	Organic production no longer included in the mix. It now contains only conventional production.

4.1.4. Update of agricultural data used for certain animal feed products

Some of the materials used to feed livestock were modeled using inventories that have become obsolete (Ecoalim data not updated).

These materials are now modeled using other data from the Ecoinvent and WFLDB libraries.

These improvements are described in Table 5

An exception was made for the Ukrainian sunflower data: as the Ecoinvent / WFLDB data were not adapted, the Ecoalim data were maintained by updating the emission models used (particularly those linked to fertilization).

Table 5 : Improved data on raw materials used for animal feed

Material	Inventory called in Ecoalim 8.1 and AGB 3.1	Inventory called in Ecoalim 9 and AGB 3.2	Comment
Wheat England	Wheat grain, conventional, national average, animal feed, at farm gate {GB} U	Wheat grain, non-irrigated, at farm {GB} - Adapted from WFLDB U	

Corn United States	Maize, animal feed, at farm gate {US} U	Maize grain, non-irrigated, at farm {US} - Adapted from WFLDB U And Maize grain, irrigated, at farm {US} - Adapted from WFLDB U	Used in Ethanol data (86% non-irrigated, 14% irrigated)
Soybeans United States	Soybean, animal feed, at farm gate {US} U	Soybean {US} production Cut-off, U - Copied from Ecoinvent U	Used in oil and cake
Palm	Palm fruit bunch, average, animal feed, at farm gate {MY} U	Palm fruit bunch {MY} production Cut-off, U - Adapted from Ecoinvent U	Used in palm oil
Coconut oil Philippines	Coconut oil, refined {PH} coconut oil refinery operation Cut-off, U - Adapted from Ecoinvent U	"Coconut oil, crude {PH} production Cut-off, S - Copied from Ecoinvent U	
Sorghum United States	Sorghum, grain, conventional, national average, animal feed, at farm gate {US} U	Sweet sorghum grain {RoW} sweet sorghum production Cut-off, U - Adapted from Ecoinvent U	Proxy for US
Cane sugar molasses Pakistan	Molasse, from sugarcane, animal feed, at sugar plant {PK} U	Molasse, from sugarcane, animal feed, at sugar plant {IN} U	Creation of sugar and cane molasses data India (largest producer) from the data "Sugarcane {IN} sugarcane production Cut-off, U - Adapted from Ecoinvent U".

4.2. Addition of an alfalfa dehydration process 100% biomass

A new alfalfa dehydration process using exclusively energy obtained from biomass has been created using Luzerne de France data representative of 2023.

4.3. Updated data on farm tractors and fuel combustion emissions

The inventories representing 3 tractors used for mechanized operations in the AGRIBALYSE agricultural data have been replaced by new, more recent inventories.

These improvements are described in Table 6

Table 6 : Improvement of tractor data used for agricultural operations

Data no longer valid	New data in AGRIBALYSE 3.2
Tractor, LT 12,000h production {FR} U	Tractor, 12000 h, 155 HP, 6 cylinders, 4WD {FR} U
Tractor, LT 10,000h production {FR} U	Tractor, 10000 h, 155 HP, 6 cylinders, 4WD {FR} U

Tractor, LT 7,500h production {FR} U	Tractor, 7200 h, 155 HP, 6 cylinders, 4WD {FR} U
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These inventories have been modelled on the basis of bibliographical sources using more recent data, including tractors fitted with emission control systems that limit emissions during fuel combustion.

Some mechanized farming operations still use specific farm machinery data, such as combine harvesters, or farm machinery data from Ecoinvent for operations outside France.

At the same time, the inventories representing fuel emissions during combustion have been updated to correspond to these tractors equipped with pollution control systems, as well as the ad-blue necessary for the engine.

4.4. Updated amino acid data for animal feed

Amino acid data supplied by METEX Noovistago for AGRIBALYSE 3.1 have been updated.

Some of amino acid production inventories took into account an impact benefit linked to the substitution of fertilizers by waste produced by the amino acid production plant.

As the AGRIBALYSE rules do not take substitution benefits into account, this benefit has been removed, increasing their impact.

In addition, a new amino acid dataset has been created using the amino acid adaptation methodology implemented for AGRIBALYSE 3.1 (Arginine Indonesia).

Finally, the supply mixes for amino acids to France have also been updated (2022-2023 data).

4.5. Update of emission models for AGRIBALYSE agricultural data

4.5.1. Update of emission models for crop production (ammonia and nitrogen oxides)

For crop production inventories carried out by AGRIBALYSE partners (not including data copied from Ecoinvent and WFLDB), i.e. the vast majority of French production, the following models have been updated:

Emissions taken into account	Version for AGRIBALYSE 3.1.1	Version for AGRIBALYSE 3.2
Ammonia from spreading organic and mineral fertilizers (NH ₃)	EMEP 2016	EMEP 2019
Nitrogen oxides from spreading organic and mineral fertilizers (NO _x)	EMEP 2009	EMEP 2019

4.5.1.1. Ammonia emission model update (EMEP tier 2)

The ammonia emission model for fertilizer application is a simple emission model based on an emission factor applied to the mass of ammoniacal nitrogen applied. The emission factor depends on the type of fertilizer. The update applies only to the emission factor.

For each type of mineral fertilizer, EMEP proposes 6 emission factors according to 3 classes of average temperature (cold, temperate, hot climate) and 2 classes of pH (less than or equal to 7; greater than 7). The following tables show only the emission factor applied to crops grown in mainland France: this corresponds to a cold climate and an average soil type with 50% of soils with a pH less than or equal to 7 and 50% of soils with a pH greater than 7.

Table 7: Changes in ammonia emission factors in the EMEP/EEA model between versions 2016 and 2019

		FE NH3 en kg NH3 / kg TAN épandu	
Classe Engrais EMEP 2016	Exemples d'engrais disponible dans MEANS-InOut et appartenant à cette catégorie	2016	2019
Ammonium nitrate (AN)	Ammonitrate 33.5	0,0235	0,0235
Ammonium phosphate (MAP and DAP)	Phosphate monoammoniaque (MAP) ; Phosphate diammoniaque	0,0705	0,0705
Ammonium sulphate (AS)	Sulfate d'ammoniaque	0,1275	0,1275
Calcium ammonium nitrate (CAN)	Ammonitrate calcaire	0,0125	0,0125
NK mixtures	Nitrate de potasse	0,0235	0,0235
NP/NPK mixtures	Tout engrais de type N-P-K	0,0705	0,0705
N solutions (Urea AN)	Urée-nitrate d'ammoniaque	0,0965	0,0965
Other straight N compounds and Calcium nitrate	Nitrate de chaux ; nitrate de magnésie	0,0145	0,0145
Urea	Urée, Perlurée	0,1595	0,1595
Engrais non spécifié	Engrais azoté moyen (non spécifié)	0,0626	0,0626
Broilers (broilers and parents), liquide	Fientes de poulets	0,801	0,461
Broilers (broilers and parents), solide	Fumier de poulet de chair ; Fumier de volaille (moyenne France)	0,801	0,461
Fattening pigs (8-110 kg), liquide	Lisier de porc, mixte	0,486	0,486
Fattening pigs (8-110 kg), solide	Fumier de porc, de litière accumulée	0,984	0,546
Laying hens (laying hens and parents), solide	Fientes de poules pondeuses sèches ; Fumier de poules pondeuses	0,838	0,546
Other Cattle (young cattle, beef cattle and suckling cows), liquide	Lisier de bovin (mix) ; Lisier de veau de boucherie	0,668	0,668
Other Cattle (young cattle, beef cattle and suckling cows), solide	Fumier de bovin (moyenne France) ; Fumier de bovin, mou de logette ; Fumier de bovin, de litière accumulée	0,959	0,826
Sheep (and goats), solide	Fumier d'ovin	1,093	1,093
Divers, liquide	Nexar Mg	0,4857	
Facteur moyen, liquide	Lisier de lapin (système raclage)	0,619	0,583
Facteur moyen, solide	Vegethumus	0,862	0,668
Sewage sludge	Boues urbaines chaulées ; Boues urbaines liquides...	0,607	0,607
Other organic waste	Farine de plumes et de sang ; Ecumes de sucrerie (amendement basique) ; Vinasse concentrée de betterave ; Amendement organique, classe B	0,08	0,08
Compost	Compost de fumier de bovin pailleux ; Compost végétal urbain...	0,971	0,971
Digestate	Digestat de lisier de porc ; Digestat de déchets verts et biodéchets...	0,729	0,729

NB: Nexar Mg and Vegethumus fertilizers have been moved from their 2016 category (Miscellaneous, liquid and Medium factor, solid respectively) to the Other organic waste category in 2019. Indeed, the "Miscellaneous, liquid" category resulting from the AGRIBALYSE processing chain created in 2010-2013 was not documented, and Vegethumus seemed closer to "organic waste" than to an average of all solid organic fertilizers.

4.5.1.2. Update of nitrogen oxides emission model (EMEP tier 1)

The emission model for nitrogen oxides due to fertilizer application is a simple emission model based on an emission factor applied to the mass of nitrogen applied. The update applies only to the emission factor.

The emission factor of 0.026 kg NO emitted per kg nitrogen applied has been replaced by a value of 0.04 kg NO₂ emitted per kg nitrogen applied.

4.5.1.3. Update on ETM emissions from organic fertilizers

In line with the recommendations of the GIS Revalim Scientific and Technical Committee, levels of seven trace metals in organic fertilizers have been updated (Table 8). The trace metals concerned are: cadmium (Cd), copper (Cu), chromium (Cr), mercury (Hg), nickel (Ni), lead (Pb) and zinc (Zn).

These changes influence ETM inputs to the soil system, and therefore ETM emissions to the soil.

For this, data from the TRACTION report on the ETM content of raw and processed animal manure.

Table 8 : Evolution of dry matter content and ETM content of organic fertilizers available in MEANS-InOut

Nom de l'engrais	Valeurs avant mise à jour teneur des ETM en mg : kg de MS								Valeurs après mise à jour teneur des ETM en mg : kg de MS							
	MS (%)	Cd	Cu	Zn	Pb	Ni	Cr	Hg	MS (%)	Cd	Cu	Zn	Pb	Ni	Cr	Hg
Compost de fumier de bovin pailleux	26,2	0,53	66,00	165,00	66,00	9,90	26,40	0,20	26,2	0,2	24,4	131,1	2,1	5,4	8,6	0,0
Farine de plumes	95,0	0,19	6,94	128,54	7,89	2,66	61,75	0,10	95	0,10	22,80	120,00	0,55	1,84	2,24	0,03
Farine de viande	95,0	0,19	6,94	128,54	7,89	2,66	61,75	0,10	95	0,29	14,16	106,20	2,59	2,57	4,82	0,08
Fientes de poules pondeuses sèches	84,8	0,19	69,40	417,00	2,55	6,15	4,85	0,60	84,8	0,3	43,0	376,0	0,5	7,3	3,6	0,0
Fumier de bovin, de litière accumulée	25,7	0,30	23,00	119,00	3,80	4,40	7,50	0,13	25,7	0,10	18,70	97,00	1,17	2,83	6,60	0,03
Fumier de bovin, mou de logette	17,4	0,30	23,00	119,00	3,80	4,40	7,50	0,13	17,4	0,10	21,60	124,00	1,00	6,63	7,48	0,03
Fumier de bovin (moyenne France)	19,9	0,30	23,00	119,00	3,80	4,40	7,50	0,13	19,9	0,13	22,10	118,00	1,00	4,21	6,67	0,03
Fumier de canards prêts à gaver	25,0	0,28	44,62	320,18	3,05	11,62	7,45	0,27	25	0,30	61,00	310,00	0,50	4,10	3,30	0,03
Fumier de porc, de litière accumulée	30,8	0,10	24,70	130,30	1,70	0,80	1,20	0,80	30,8	0,16	126,00	343,50	0,50	3,33	4,33	0,02
Fumier de poules pondeuses	60,0	0,3	39,6	468,4	2,2	7,9	5,5	0,2	60	0,20	42,50	285,00	0,50	5,25	3,70	0,03
Fumier de poulets de chair	62,2	0,29	39,00	174,00	2,92	40,00	10,00	0,20	62,2	0,10	53,00	338,00	0,50	5,60	4,10	0,03
Fumier d'ovin	30,0	0,10	12,50	56,70	1,10	2,10	1,90	0,10	30	0,17	12,30	138,00	0,50	6,33	8,30	0,03
Lisier de bovin moyen	7,5	0,18	37,10	162,20	3,77	4,30	3,90	0,40	7,5	0,10	46,10	204,00	1,96	5,57	9,99	0,03
Lisier de bovin non dilué	9,1	0,00	4,30	22,00	0,50	0,80	0,80	0,00	9,1	0,10	46,10	204,00	1,96	5,57	9,99	0,03
Lisier de bovin dilué	3,8	0,16	19,10	123,30	2,92	3,10	2,10	0,40	3,8	0,10	46,10	204,00	1,96	5,57	9,99	0,03
Lisier de lapin (système raclage)	10,6	0,2	71,7	444,6	2,6	6,2	4,9	0,6	10,6	0,50	54,20	244,70	0,50	5,40	0,50	0,03
Lisier de porc, mixte	3,6	0,5	357,0	1046,0	4,7	14,0	13,4	0,8	3,6	0,48	281,50	847,33	17,19	14,20	4,08	0,07
Lisier de veau de boucherie	1,1	0,18	37,10	162,20	3,77	4,30	3,90	0,40	1,1	0,10	55,70	2,80	36,00	19,30	20,30	0,08
Compost de lisier de porc sur paille	37,1	0,12	69,66	270,90	6,19	9,29	15,48	0,20	37,1	0,47	145,00	821,00	1,50	9,40	8,30	0,03
Compost de fumier de porc à base de paille	45,3	1,0	120,0	602,0	4,9	3,8	5,5	0,2	45,3	0,20	90,00	419,00	0,90	4,40	3,40	0,03
Lisier de canard (à rôtir ou en gavage)	10,4	0,19	71,70	444,63	2,55	6,15	4,85	0,60	10,4	0,40	83,00	397,00	0,50	0,60	0,50	0,03
Compost de fumier de volaille (MS 70 %)	70,0	1,72	132,74	410,31	121,36	30,85	71,92	0,64	70	0,20	72,10	387,30	0,50	6,00	14,40	0,03
Farine de plumes et de sang	100,0	0,20	7,30	135,30	8,30	2,80	65,00	0,10	100	0,10	22,80	120,00	0,55	1,84	2,24	0,03
Fumier d'ovin, de litière accumulée	30,0	0,10	12,50	56,70	1,10	2,10	1,90	0,10	30	0,17	12,30	138,00	0,50	6,33	8,30	0,03
Fumier de volaille (moyenne France)	64,1	0,29	39,30	177,60	2,92	40,00	10,00	0,20	64,1	0,20	65,00	351,67	0,75	6,27	5,33	0,03
Compost de fraction solide de lisier de porc	53,6	0,3	326,0	949,5	7,8	13,0	16,8	0,0	53,6	0,42	209,00	944,00	1,75	9,80	8,90	0,03
Digestat de lisier de porc	8,0	1,80	30,78	79,63	8,90	16,10	31,80	0,00	8	0,48	281,50	847,33	17,19	14,20	4,08	0,07
Digestat de lisier de bovin	16,7	0,56	73,00	304,00	6,70	8,10	7,60	0,00	16,7	0,10	46,10	204,00	1,96	5,57	9,99	0,03
Digestat de fumier et lisier	11,5	0,80	54,40	167,20	6,00	9,30	16,10	0,03	11,5	0,19	65,50	324,00	0,95	5,50	5,99	0,03
Fraction liquide de digestat d'un mix de lisier	5,6	1,20	77,08	197,35	7,80	12,10	19,70	0,00	5,6	0,17	92,13	420,60	11,32	8,39	2,93	0,02
Boues biologiques, issues d'un traitement aérobie (nitrification/dénitrification)	4,6	0,5	357,0	1046,0	4,7	14,0	13,4	0,8	4,6	0,84	542,00	1813,00	16,50	17,70	6,60	0,08
Compost de fiente de volaille avec litière (MS 37 %)									37	0,20	72,10	387,30	0,50	6,00	14,40	0,03

4.5.2. Update of animal production emission models (ammonia, nitrogen oxides, methane and nitrous oxide)

4.5.2.1. Ammonia emission model update (EMEP tier 2)

Figure 6 shows the overall operation of the ammonia emission model used for animal production in AGRIBALYSE (EMEP, tier 2).

The update did not change the equations, but only the values of the model parameters. The changes in these parameter values are presented in Table 9

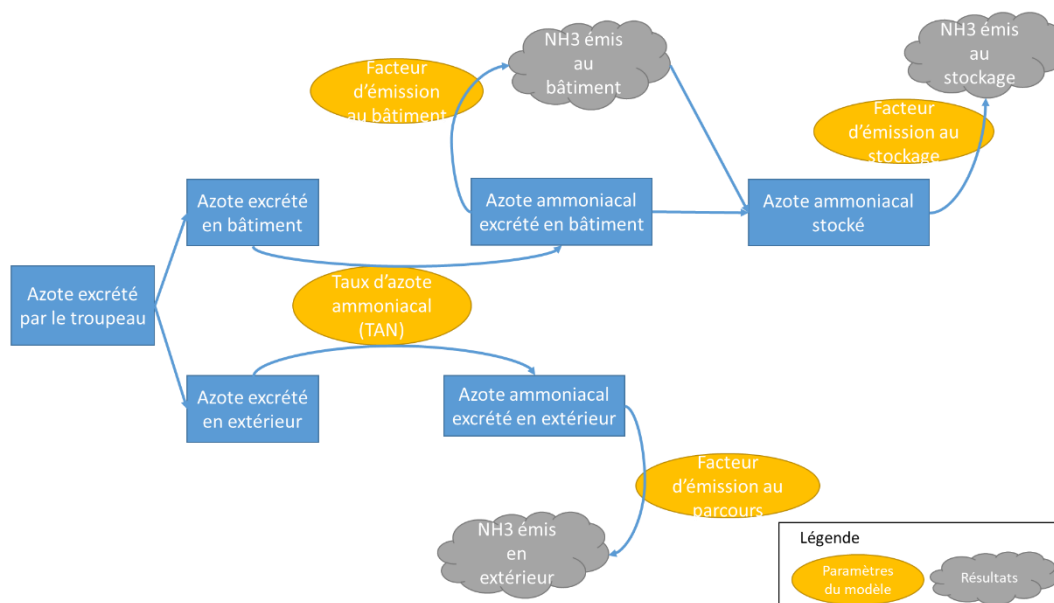


Figure 6 : Simplified operation of the EMEP (Tier 2) ammonia emission model for livestock production, used for the AGRIBALYSE database.

Table 9 : Evolution of EMEP ammonia emission model parameters between versions 2009 and 2019

Espèce	Précision EMEP	Taux d'azote ammoniacal (TAN)		Forme de la déjection	Facteur d'émission bâtiment		Facteur d'émission stockage		Facteur d'émission parcours	
		2009	2019		2009	2019	2009	2019	2009	2019
Porc	Truies	0,7	0,7	liquide	0,22	0,35	0,14	0,11	0,25	0,31
				solide	0,25	0,24	0,45	0,29		
Porc	Porcs à l'engrais (8-110 kg)	0,7	0,7	liquide	0,28	0,27	0,14	0,11	0,53	0,53
				solide	0,27	0,23	0,45	0,29		
Poulet		0,7	0,7	solide	0,28	0,21	0,17	0,3	0,3	0,3
Dindes		0,7	0,7	solide	0,35	0,35	0,24	0,24	0,3	0,3
Canard et palmipèdes à foie gras		0,7	0,7	liquide	0,34	0,34	0,34	0,34	0,34	0,34
				solide	0,24	0,24	0,24	0,24	0,3	0,3
Poules pondeuses		0,7	0,7	liquide	0,41	0,41	0,14	0,14	0,3	0,3
				solide	0,41	0,2	0,14	0,08		
Bovin	Vache laitière	0,5	0,6	liquide	0,2	0,24	0,2	0,25		
				solide	0,19	0,08	0,27	0,32		
	Autres bovins	0,6	0,6	liquide	0,2	0,24	0,2	0,25		
		0,6	0,6	solide	0,19	0,08	0,27	0,32		
Ovin		0,5	0,5	solide	0,22	0,22	0,28	0,32		
Caprin		0,5	0,5	solide	0,22	0,22	0,28	0,28		
Lapin		0,6	0,6	liquide	0,27	0,27	0,09	0,09		
				solide	0,27	0,27	0,09	0,09		

The rate of ammoniacal nitrogen in dejection is expressed in kg of nitrogen in ammoniacal form (or kg of TAN) per kg of nitrogen: it is therefore dimensionless. Emission factors for building, storage and grazing are expressed in kg N_{NH3} per kg TAN, and are dimensionless.

NB: no emission factor for grazing is presented for ruminants, as ammonia emissions on pasture are managed at grassland level and not at animal workshop level.

4.5.2.2. Update of the nitrogen oxides emission model (EMEP tier 1)

The nitrogen oxide emission model for animal workshops is a simple emission model based on an emission factor (a function of species and type of manure) applied to the number of animals present. The emission factor depends on the species and type of manure (solid or liquid).

The update applies to emission factor values only.

Table 10: Changes in nitrogen oxide emission factors in the EMEP model between versions 2016 and 2019

Espèce	Précision EMEP	Forme de la déjection	Facteur d'émission (kg de NO ₂ /tête)	
			2016	2019
Porc	Truies	liquide	0,006	0,005
		solide	0,204	0,471
	Porcs à l'engrais (8-110 kg)	liquide	0,002	0,002
		solide	0,069	0,017
Poulet		solide	0,002	0,027
Dindes		solide	0,008	0,027
Canard et palmipèdes à foie gras		liquide	0,004	0,022
		solide	0,004	0,022
Poules pondeuses		liquide	0,0002	0,0001
		solide	0,005	0,014
Bovin	Vache laitière	liquide	0,011	0,01
		solide	0,236	0,752
	Autres bovins	liquide	0,003	0,003
		solide	0,144	0,217
Ovin		solide	0,008	0,012
Caprin		solide	0,008	0,012
Lapin		liquide	0,0003	0,001
		solide	0,0003	0,001

4.5.2.3. Nitrous oxide emission model update (IPCC tier 2)

The emission model for nitrous oxide linked to manure storage is based on an emission factor (a function of the type of manure and the type of storage). The emission factor is applied to the amount of nitrogen excreted by the herd.

The update applies to emission factor values only.

Table 11: Changes in nitrous oxide emission factors in the IPCC model between the 2016 and 2019 versions

Type de stockage	Type de déjection	Espèces concernées	Facteur d'émission (kg de N ₂ O/ kg de N excrété)	
			2006	2019
Fosse à lisier non couverte sans croute	Lisier	bovin, porc, lapin	0	0
	Lisier ou fientes	poulet, dinde, poules pondeuses, canard	0	0,001
Fosse à lisier non couverte avec croute	Lisier	bovin, porc, lapin	0,005	0,005
	Lisier ou fientes	poulet, dinde, poules pondeuses, canard	0,005	0,001
Fosse à lisier couverte sans croute	Lisier	bovin, porc, lapin	0	0,005
	Lisier ou fientes	poulet, dinde, poules pondeuses, canard	0	0,001
Fosse à lisier non couverte avec croute	Lisier	bovin, porc, lapin	0,005	0,005
	Lisier ou fientes	poulet, dinde, poules pondeuses, canard	0,005	0,001
Fumière (couverte ou non couverte)	Fumier	bovin, ovins, caprins, lapin	0,005	0,01
	Fumier	porc	0,07	0,07
	Fumier ou fientes	poulet, dinde, poules pondeuses, canard	0,005	0,001
Stockage en bout de champ	Fumiers compacts	ovin, caprin, porc, lapin	0,02	0,02
	Fumiers compacts	bovin	0,02	0,01
	Fumiers compacts	poulet, dinde, poules pondeuses, canard	0,02	0,001

4.5.2.4. Updated methane emission model for dung storage (IPCC tier 2)

The methane emission model for manure storage used for livestock production in AGRIBALYSE (IPCC, tier 2) uses Equation 1

Equation 1 : methane emission model for manure storage

$$EF = SV * B_0 * 0.67 * FMC/100$$

With :

- EF : methane emission factor, linked to manure storage, per animal per year (in kg CH₄ /(head*year))
- SV : Volatile solids excreted per animal per year (in kg of SV/(head*year))
- B₀ : maximum methane production capacity of stored dejecta, in m³ CH₄ / kg SV. B₀ varies according to species.
- 0.67: conversion factor from volume of CH₄ to mass (in kg/m³)
- FMC : percentage of B₀ achievement for type of stored excreta, type of storage and climate in %.

The emission factor is then applied to the number of animals present.

In the Equation 1, it is the FMC factor that has been updated between the 2006 and 2019 versions of the IPCC tier 2 model. France has moved from the "cool" to the "warm temperate moist" category, which increases the FMC. In addition, for certain storage categories, the duration of dejection storage is now a mandatory factor in determining the CMF.

Table 12: FMC values used for France in AGRIBALYSE with the 2006 version of the IPCC tier 2 methane emission model for manure storage.

Type de stockage	Type de déjection	Espèces concernées	Précision type de stockage	FMC (%)
Fosse à lisier	Fientes	Poulet, dinde, poules pondeuses, canard	Fosse sans croute	22
			Fosse avec croute	14
Fosse à lisier	Lisier	Bovin, porcin, lapin, canard	Fosse sans croute	22
			Fosse avec croute	14
Fumière	Fientes	Dinde, canard		1,5
Fumière	Fientes	Poulet		2
Fumière	Fientes	Poules pondeuses		2
Fumière	Fumier	Bovin, ovins, caprins, lapin		2
Fumière	Fumier	Poulet, poules pondeuses		2
Fumière	Fumier	Dinde, canard		1,5
Stockage en bout de champ	Fientes	Poulet, dinde, poules pondeuses, canard		
Stockage en bout de champ	Fumier	Poulet, poules pondeuses		2
Stockage en bout de champ	Fumier	Dinde, canard		1,5
Fumière ou stockage en bout de champ	Fumier de litière accumulée	Bovin, ovin, caprin		22
Fumière ou stockage en bout de champ	Fumier de porc à base de paille	Porcin		21
Séchage forcé	Fientes	Poulet, dinde, poules pondeuses		1,5

Table 13: FMC values used for France in AGRIBALYSE with the 2006 version of the IPCC tier 2 methane emission model for manure storage.

Type de stockage	Type de déjection	Espèces concernées	Temps de stockage	FMC (%), France	FMC (%), zone Warm temperate moist
Fosse à lisier	Fientes	Poulet, dinde, poules pondeuses, canard	Moins d'un mois	12	13
			De 1 à 3 mois	21	24
			De 3 à 4 mois	26	29
			De 4 à 6 mois	33	37
			De 6 mois à 1 an	41	55
Fosse à lisier	Lisier	Bovin, porcin, lapin, canard	Moins d'un mois	12	13
			De 1 à 3 mois	21	24
			De 3 à 4 mois	26	29
			De 4 à 6 mois	33	37
			De 6 mois à 1 an	41	55
Fumière	Fientes	Dinde, canard		1,5	1,5
Fumière	Fientes	Poulet		1,5	1,5
Fumière	Fientes	Poules pondeuses		4	4
Fumière	Fumier	Bovin, ovins, caprins, lapin		4	4
Fumière	Fumier	Poulet, poules pondeuses		1,5	1,5
Fumière	Fumier	Dinde, canard		1,5	1,5
Stockage en bout de champ	Fientes	Poulet, dinde, poules		1,5	1,5
Stockage en bout de champ	Fumier	Poulet, poules pondeuses		1,5	1,5
Stockage en bout de champ	Fumier	Dinde, canard		1,5	1,5
Fumière ou stockage en bout de champ	Fumier de litière accumulée	Bovin, ovin, caprin		37	37
Fumière ou stockage en bout de champ	Fumier de porc à base de paille	Porcin		37	37
Séchage forcé	Fientes	Poulet, dinde, poules		1,5	1,5

The values in the "FMC (%), Warm temperate moist zone" column are those given in the IPCC document "2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories" Chapter 10: Emissions from livestock and manure management; the values in the "FMC (%), France" column were calculated by the MEANS team on the basis of the calculator provided by IPCC 2019 and French monthly temperatures from 2018 to 2021.

4.6. Update of organic fertilizers used by organic production inventories

The ACV Bio inventories were generated before AGRIBALYSE v3.1 update. This implies that updates deployed on other AGRIBALYSE v3.1 data have not been applied to the LCIs of ACV Bio. This paragraph explains the updates specific to Organic LCIs, which had already been applied to other plant LCIs for AGRIBALYSE 3.1.

4.6.1. Update on organic fertilizers

In 2020, references for organic fertilizers proposed by the MAFOR project enabled an update of organic fertilizers in MEANS-InOut. This update involves modifications to the following parameters:

- Modification of the total N content of fertilizers
- Modification of ammoniacal N content in fertilizers
- Modification of the ammonia emission factor associated with these fertilizers.

This change was reported and detailed in the AGRIBALYSE database agricultural LCI modification report for the transition from version 3.0 to 3.1.

Similarly, this update on organic fertilizers has changed the way in which some of these organic fertilizers are linked to LCIs, notably livestock manure composts, sewage sludge and digestates. These organic fertilizers, which before the update pointed to empty LCIs (with no impact), now point to LCIs with environmental impacts, such as the LCI "Compost, of swine slurry and straw (amendment) {RER} U".

As of this version 3.2 of the AGRIBALYSE DB, the update of organic fertilizers is extended to the LCIs from the Organic LCA project.

4.6.2. Nitrous oxide (N₂O) emission model update: IPCC tier 1

IPCC tier 1 2006 model has been replaced by IPCC tier 1 2019 model.

Nitrogen inputs from mineral and organic fertilizers and crop residues generate direct and indirect N₂O emissions. The emission model for nitrous oxide in the field is based on emission factors, applied to the quantity of nitrogen supplied by fertilizers and crop residues for direct emissions; and applied to the quantities of nitrogen in other nitrogenous emissions for indirect emissions.

The update applies to emission factor values only.

The evolution of emission factors between the two versions of the IPCC model was described in the report on the modification of agricultural LCIs in AGRIBALYSE database for the transition from version 3.0 to 3.1.

From this version 3.2 of AGRIBALYSE database, the N₂O IPCC 2019 emission model is applied to the LCIs of plant products from the ACV Bio project.

4.7. Corrections

4.7.1. Correction of occupancy and land-use transformation for inventories representing crop shelters (greenhouses, tunnels)

In AGRIBALYSE 3.1.1, for greenhouse and tunnel crops, land use and land transformation were reported in the infrastructure inventories, and certain types of transformation had negative impacts on the Land use change indicator.

For AGRIBALYSE 3.2, the following changes have been made:

Land use and land transformation flows have been removed from the greenhouse and tunnel inventories. This concerns the following inventories:

- Greenhouse, glass walls and roof, metal tubes {FR} U
- Greenhouse, glass walls and roof, plastic tubes {FR} U
- Greenhouse, plastic walls and roof, metal tubes {FR} U
- Greenhouse, plastic walls and roof, plastic tubes {FR} U
- Plastic tunnel {FR} U

Land occupation and land use transformation flows were implemented in the crop LCIs, using the following flows:

- Occupation, annual crop, greenhouse
- Transformation, from annual crop, greenhouse
- Transformation, to annual crop, greenhouse

LCIs of the crops affected by this change are given in Appendix 1

As a result of these changes, negative impacts on land use indicator are no longer present for the LCIs for crops grown under cover.

4.7.2. Correcting the use of carbon storage/removal flows in AGRIBALYSE inventories

For several data items, carbon storage/removal flows were present in excess or missing.

The corrections made are listed in the Table 14

Table 14 : Correction of carbon storage/removal flows for various agricultural data

Inventories concerned	Correction made
Annual vining pea for industry, Conventional, National average, at farm gate {FR} U	<p>Deleted flow :</p> <p>Land use change, soil organic carbon changes for annual crops and temporary meadows {EN} U and Additionnal storage of soil organic carbon due to farming practice, Insertion and lengthening of intermediate crops {FR} U</p> <p>➔ because applicable only to field crop inventories and not to vegetable inventories</p>
Chicory witloof seed, conventional, at production site {FR} U	
Chicory witloof, early, conventional, root production, at farm gate {FR} U	
Chicory witloof, late, conventional, root production, at farm gate {FR} U	
Chicory witloof, season, conventional, root production, at farm gate {FR} U	
Chicory witloof, season, organic, root production, at farm gate {EN} U	
Spring faba bean, organic (model type), Central Region, at farm gate {FR} U	<p>Added flow :</p> <p>Land use change, soil organic carbon changes for annual crops and temporary meadows {EN} U and Additionnal storage of soil organic carbon due to farming practice, Insertion and lengthening of intermediate crops {FR}</p> <p>➔ because applicable to field crop inventories and missing from the previous version</p>
Sunflower grain, organic, system number 1, at farm gate {FR} U	
Sunflower grain, organic, system number 3, at farm gate {FR} U	
Sunflower grain, organic, system number 4, at farm gate {FR} U	
Sunflower grain, organic, system number 5, at farm gate {FR} U	

4.7.3. Correction of land-use transformation flows for 4 inventories

In several LCIs derived from organic LCAs, there were still land-use transformation flows calculated using the PAS 2050 model, which is not used in AGRIBALYSE. These flows have been removed from the LCIs concerned. These are the following LCIs:

- Baled hay, permanent meadow, organic, system number 4, at farm gate {FR} U
- Soybean grain, organic, at farm gate {CN} U
- Soybean grain, organic, at farm gate {IN} U
- Spelt, organic, at farm gate {FR} U

4.7.4. Correction of land-use flows for 4 inventories

4 inventories used the "Occupation, heterogeneous, agricultural" flow, which has now been replaced by the "Occupation, unspecified, used" flow.

- Potted shrub, wintering (phase), in greenhouse, high density, at production site {FR} U
- Potted shrub, growing period (phase), outdoor phase, low density, at production site {FR} U
- Chicory witloof, season, conventional, refrigerant loss 300%, storage and forcing, at farm gate {FR} U
- Chicory witloof, season, conventional, NH3, storage and forcing, at farm gate {FR} U

4.7.5. Correction of co-product allocations for 2 cropping system data sets

For the following 3 systems generating 7 LCIs, allocation errors between system products have been corrected:

Permanent grassland system, beef cattle, Rhône Alpes :

- Grazed grass, permanent meadow, organic, suckler cow and beef fattening system number 4, at farm gate {FR} U
- Baled hay, permanent meadow, organic, suckler cow and beef fattening system number 4, at farm gate {FR} U
- Baled grass, permanent meadow, organic, suckler cow and beef fattening system number 4, at farm gate {FR} U
- Grazed grass, permanent meadow, organic, suckler cow and beef fattening system number 2, at farm gate {FR} U
- Baled hay, permanent meadow, organic, suckler cow and beef fattening system number 2, at farm gate {FR} U

Triticale-pea crop association :

- Triticale grain, from intercrop, organic, system number 3, at farm gate {FR} U
- Winter pea, from intercrop, organic, system number 3, at farm gate {FR} U

The correction is used to allocate impacts to co-products according to the factors indicated in the LCI documentation.

This correction leads to increases and reductions in impacts that can be significant for several data items, in particular for organic production.

4.7.6. Correction of the inventory used to represent copper sulfate

In previous versions of AGRIBALYSE, the fungicide copper sulfate was combined with the LCI Copper oxide {RER}| production | Cut-off, S

The correspondence has been corrected with the Ecoinvent data: "Copper sulfate {GLO}| production | Cut-off, S - Copied from Ecoinvent U".

4.7.7. Correction of nitrogen fertilization emissions for 1 chicory production inventory

In the endive production data "Chicory roots, conventional, at farm gate {FR} U", no direct nitrogen emissions (ammonia, nitrogen oxides, nitrous oxide, nitrate) were taken into account in the v3.1.1 inventory.

These emissions have been added to the new inventory.

4.7.8. Correction of the amount of diesel used for 1 pineapple production inventory

In the data representing pineapple production "Pineapple, at farm {TH} U" and "Pineapple, at farm {KE} U", the quantity of diesel was overestimated and has been corrected.

4.7.9. Fixed water flow used for 1 shrimp production inventory

In the LCI for shrimp production in China "Fresh shrimps, China production {FR} U", the flow representing water use for farming was not characterized by the EF3.1 method, while the flow representing water discharge into the environment was characterized, resulting in negative impacts on the Water use indicator for shrimp products.

The LCI has been corrected to account for impacts linked to water use, which has corrected the negative impacts observed.

5. Agri-food products data update

5.1. Addition and updating food products from the INCYVIE project

As part of the InCyVie batch 1 project, several products were improved. Depending on the product, only the recipe or several life cycle stages were improved. For example, duck slaughter stages were also created to establish appropriate allocations.

The methodology for these products is described in a dedicated report .

The products concerned are listed in Table 15

Table 15 : products added or updated as part of the Incyvie Lot 1 project

Product name	Product name	CIQUAL number	Institute
Foie gras, whole	Whole duck foie gras, pasteurized	8321	CTCPA
Foie gras, block	Block duck foie gras, pasteurized	8331	CTCPA
Duck rillettes	Rillettes, duck	8026	CTCPA
Duck Confit	Duck confit (conserved in rendered fat), meat (leg) without skin, reheated	8110	CTCPA
Duck terrine	Duck terrine	8232	CTCPA
Duck, smoked duck breast	Duck breast fillet, smoked	8111	CTCPA
Albacore or white tuna, in olive oil, sterilized, drained	Albacore, in olive oil, canned, drained	26179	CTCPA

Yellowfin or albacore tuna, in brine, sterilized, drained	Yellowfin tuna, canned in brine, drained	26181	CTCPA
Mackerel, white wine fillet, drained, sterilized	Mackerel, fillet, in white wine, canned, drained	26097	CTCPA
Sardines, in olive oil, drained and sterilized	European pilchard or sardine, in olive oil, canned, drained	26040	CTCPA
Anchovies, fillets in oil, semi-preserved, drained	Anchovy, fillets, in oil, semi-preserved, drained	26000	CTCPA
Goose liver pâté	Goose liver pate	8326	IFIP
Poultry liver pâté	Poultry liver pate	8316	IFIP
Pork liver pâté	Pork liver pate	8305	IFIP
Pork liver pâté (superior quality)	Pork liver pate, superior quality	8300	IFIP
Pork liver mousse	Pork liver mousse	8313	IFIP
Pork liver mousse (superior quality)	Pork liver mousse, superior quality	8312	IFIP
Goose rillettes	Rillettes, goose	8030	IFIP
Pure goose rillettes	Rillettes, pure goose	8025	IFIP
Poultry rillettes	Rillettes, poultry	8040	IFIP
Green pepper pâté	Pate w green pepper	8201	IFIP
Breton pâté	Breton pate	8214	IFIP
Country terrine or paté	Country-style pate or terrine	8211	IFIP
âté of game	Game pate	8245	IFIP
Duck mousse	Duck mousse	8315	IFIP
Pork rillettes	Rillettes, pork	8000	IFIP
Pure pork rillettes	Rillettes, pure pork	8001	IFIP
Rillettes de Tours	Rillettes from Tours	8010	IFIP
Rillettes du Mans	Rillettes from Mans	8015	IFIP
Vegetable fat (margarine type), spreadable, 30-40% MF, light, semi-salted	Vegetable fat (margarine type), spreadable, 30-40% fat, light, lightly salted	16734	ITERG
Vegetable fat (margarine type), spreadable, 30-40% MF, light, mild	Vegetable fat (margarine type), spreadable, 30-40% fat, light, unsalted	16733	ITERG

Vegetable fat (margarine type) 50-63% fat, low-fat, semi-salted, rich in omega 3	Vegetable fat (margarine type), spreadable, 50-63% fat, light, lightly salted, rich in omega 3	16740	ITERG
Vegetable fat (margarine type) 50-63% MF, low-fat, mild, rich in omega 3	Vegetable fat (margarine type), spreadable, 50-63% fat, light, unsalted, rich in omega 3	16737	ITERG
Vegetable fat (margarine type) 60% fat, low-fat, sunflower-based, mild	Vegetable fat (margarine type), 60% fat, unsalted, sunflowerseed	16654	ITERG
70% vegetable fat (margarine type), mild	Vegetable fat (margarine type), 70% fat, unsalted	16616	ITERG
Goat's milk yoghurt, plain, approx. 5% MF	Yogurt, goat's milk, plain, around 5% fat	19556	ACTALIA
Yoghurt, fermented milk or dairy speciality, flavoured, sweetened	Yogurt, fermented milk or dairy specialty, flavoured, with sugar	19575	ACTALIA
Yoghurt, fermented milk or dairy speciality, with cereals	Yogurt, fermented milk or dairy specialty, w cereals	19579	ACTALIA
Yoghurt, fermented milk or dairy speciality, with chocolate chips, cream, sweetened	Yogurt, fermented milk or dairy specialty, with chocolate shavings, with sugar	19580	ACTALIA
Yoghurt, fermented milk or dairy speciality, with fruit, sweetened	Yogurt, fermented milk or dairy specialty, w fruits, with sugar	19587	ACTALIA
Yoghurt, fermented milk or dairy speciality, plain	Yogurt, fermented milk or dairy specialty, plain	19593	ACTALIA
Yoghurt, fermented milk or dairy speciality, plain, sweetened	Yogurt, fermented milk or dairy specialty, plain, w sugar	19599	ACTALIA
Plain fromage frais, approx. 3% fat	Fresh cream cheese, plain, around 3% fat, at plant {FR}, U	19646	ACTALIA

5.2. Addition and updating milk powder and infant formula data

5.2.1. Updated data on milk powders for human and animal consumption

Two milk powder data were available in AGRIBALYSE 3.1 :

- Skimmed milk powder, at feed plant S {FR} U (aggregated version) used for animal feed and milk powder products / recipes for human consumption
- Milk powder, skimmed, spray dried, at dairy {RER} - Adapted from WFLDB U: adapted from the WFLDB data "Milk powder, skimmed, spray dried, at dairy {RER}" using French milk and including a yield adaptation based on ACTALIA recommendations: used by the WFLDB chocolate recipe data implemented in AGRIBALYSE.

For AGRIBALYSE 3.2, the data item "Skimmed milk powder, at feed plant S {FR} U" has been marked obsolete due to its age.

The data "Milk powder, skimmed, spray dried, at dairy {RER} - Adapted from WFLDB U" has been declined in several versions used in different products:

Table 16: Enhanced data for milk powders

Inventory name	Adjustment made	Use in the database
Milk powder, skimmed, spray dried, at dairy {RER} - Adapted from WFLDB U	Correction of dehydration process quantities called for, use of French skimmed milk	Recipes and CIQUAL product milk powder
Milk powder, semi skimmed, spray dried, at dairy {RER} - Adapted from WFLDB U	Correction of dehydration process quantities called for, use of semi-skimmed milk French	CIQUAL product semi-skimmed milk powder
Milk powder, whole, spray dried, at dairy {RER} - Adapted from WFLDB U	Correction of dehydration process quantities called for, use of semi-skimmed milk French	CIQUAL product whole milk powder
Lactoserum powder, spray dried, at dairy {RER} - Adapted from WFLDB U	Correction of called dehydration process quantities, use of whole milk, yield adaptation, based on Kenaveau publication	2 animal feed rations using "Skimmed milk powder, at feed plant S {FR} U".

5.2.2. Improved recipes from baby products

A number of baby food recipes have been updated based on recommendations from the SFAE (syndicat français de l'alimentation de l'enfance).

The updated recipes are as follows:

Table 17: Improved infant formula recipes

Product name	Product name	Use in CIQUAL products
Instant cereals, reconstituting powder	Instant cereal for baby, powder	13167_1
		13167_2
		13168_1
		13168_2
Infant cereal drinks	Dairy cereal-based beverages for baby's breakfast	13170
		13163
		13169
		13173
		13162
		13161

Infant milk, powdered	Baby milk, powder	3000_1 3000_2 3002_1 3002_2 19012_2
Infant milk, liquid	Baby milk, ready to feed	19012_1 13013 19014

5.2.3. Addition of CIQUAL products representing reconstituted infant products at consumer

Several baby products were available in AGRIBALYSE 3.1 only as unreconstituted powders. For AGRIBALYSE 3.2, products have been created to reconstitute these powders into products consumed by the consumer. In addition, the recipes for these products have been improved (see section on recipe improvements).

The following products have been added:

Table 18: Consumer reconstituted infant milk data added

Product name	Product name	CIQUAL number
Milk 1st age, soluble powder (infant formula), rehydrated by consumer	Baby milk, first age, rehydrated with water at consumer step	3000_2
2nd age milk, soluble powder (follow-on formula), rehydrated by consumer	Baby milk, second age, rehydrated with water at consumer step	3002_2

5.3. Addition of vegetarian food products

Several products based on vegetarian recipes have been added to AGRIBALYSE 3.2 by ITERG.

The methodology for these products is described in a dedicated report .

The products concerned are as follows:

Table 19: Added vegetarian food products

Product name	Product name	CIQUAL number
Cheese cereal cake (soy-free), prepackaged	Cereal patty with cheese (without soybean)	25233_1
Breaded cutlet, soy, wheat and cheese, cordon bleu type, prepacked	Schnitzel, soybean, wheat and cheese-based, cordon bleu-style	25230

Vegetable cereal patty (soy-free), prepackaged	Cereal patty with vegetables (without soybean)	25234
Soy and wheat breadcrumbs (not suitable for vegans or vegetarians)	Schnitzel, soybean and wheat-based (not vegan)	25228
Wheat nuggets (soy-free), prepackaged	Wheat-based nuggets (wo soybean)	25225
Falafel or Chickpea and/or Bean Dumpling, prepackaged	Falafel, prepacked	25590
Copra oil	Coconut oil (coprah)	16060
Soy and wheat nuggets (not suitable for vegans or vegetarians), prepackaged	Soybean and wheat-based nuggets (not vegan)	25226
Soy nuggets	Soybean-based nuggets	25227_2
Vegetable dumplings (meatless)	Vegetable ball (without meat)	25589_2
Pre-packaged wheat (seitan) and vegetable galette or pavé	Plant-based patty or steak from wheat (seitan) and vegetables	25592
Breaded soy and wheat sticks (suitable for vegans or vegetarians), prepackaged	Schnitzel, soybean and wheat-based (vegan)	25229
Lentil, soy and vegetable patty or pavé, prepackaged	Plant-based patty or steak from lentil, soybean and vegetables	25591
Wheat and soy patties (not suitable for vegans or vegetarians), pre-packaged	Plant-based patty or steak from wheat and soybean (not vegan)	25594
Pre-packaged soy and cheese patty or pavé	Plant-based patty or steak from soybean and cheese	25595
Soy, cheese and vegetable patty or pavé, prepackaged	Plant-based patty or steak from soybean, cheese and vegetables	25597_1

5.4. Addition of a product representing tap water

A product representing tap water has been added to the database. It is based on the Ecoinvent data "Tap water {FR}| market for tap water | Cut-off, U - Adapted from Ecoinvent U" which has been adapted to use regionalized water flows for France.

5.5. Improving cocoa products

Based on Alliance 7 recommendations, products representing non-rehydrated cocoa powder have been removed, with the exception of bitter cocoa powder, which can be used in culinary preparations.

These developments are listed in Table 20.

Table 20 : Trends in cocoa products (products retained and products discontinued)

Product name	Product name	CIQUAL number	Evolution
Sweetened cocoa or chocolate powder for beverages, enriched with vitamins and minerals	Cocoa or chocolate powder, for beverages, with sugar, fortified with vitamins and chemical elements, non rehydrated	18167	Deleted
Cocoa or chocolate powder for beverages, sweetened, vitamin-enriched	Cocoa or chocolate powder, for beverages, with sugar, fortified with vitamins, non rehydrated	18168	Deleted
Cocoa or chocolate powder for beverages, sweetened	Cocoa or chocolate powder, for beverages, with sugar, non rehydrated	18101	Deleted
Cocoa, unsweetened, soluble powder	Cocoa powder, without sugar, powder, instant, non rehydrated	18100	Maintained

5.6. Improving coffee products

5.6.1. Improving the coffee consumption mix

AGRIBALYSE 3.1 included two consumption mixes (for Arabica and Robusta coffees).

The production data for coffee from Ecoinvent has been updated, and a single consumption mix is now available for coffee. The percentages of origin are taken from the Ecoinvent inventory representing the global market data "Coffee, green bean {GLO}| market for coffee, green bean | Cut-off, U".

5.6.2. Improvement of CIQUAL products representing coffee

Based on the recommendations of Alliance 7, products representing non-rehydrated coffee powder for consumers have been discontinued, with the exception of a bitter coffee powder for use in culinary preparations (listed in table 21).

Table 21 : Changes in coffee products (products kept and products discontinued)

Product name	Product name	CIQUAL number	Evolution
Milk coffee or chocolate cappuccino, soluble powder	Coffee with milk or Cappuccino with chocolate, powder, instant, non rehydrated	18163	Deleted
Café au lait or cappuccino, soluble powder	Coffee with milk or Cappuccino, powder, instant, non rehydrated	18160	Deleted
Coffee, soluble powder	Coffee, powder, instant, non rehydrated	18005	Deleted
Coffee, decaffeinated, soluble powder	Decaffeinated coffee, powder, instant, non rehydrated	18069	Deleted
Chicory and coffee, soluble powder	Mix of chicory and coffee, powder, instant, non rehydrated	18150	Deleted
Coffee, ground	Coffee, ground	18003	Maintained

5.7. Improving potato flake products

CIQUAL potato flakes (CIQUAL 4022 and 4016) were approximated by potato and potato puree. In order to specify their impacts, they have been remodeled to take into account :

- A potato dehydration stage (process and yields based on the moisture content of raw and dried products obtained from the ANSES CIQUAL database, such as the other dehydrated products in the database). This change results in a significant increase in the value of the product for the consumer.
- Removal of the preparation method, with CIQUAL products representing non-rehydrated flakes.

In addition, CIQUAL products representing potato purees (CIQUAL 4017 and 4019) obtained from flakes have also been updated to use these flakes.

5.8. Yeast data update

Data on yeasts obtained from fermentation have been placed in obsolete status until data representing this production method is created.

In parallel, a recipe representing the production of baking powder was created based on Open Food Facts data, to replace the proxy previously used: "Baking powder or raising agent".

These developments are listed in Table 22

Table 22 : Suppressed yeast data

Product name	Product name	CIQUAL number
Baker's yeast, compressed	Baker's yeast, compressed	11010
Baker's yeast, dehydrated	Baker's yeast, dehydrated	11045
Nutritional yeast	Nutritional yeast	11009

5.9. Updating consumption mix data

Some consumption mixes have been adjusted to use more appropriate raw material production data. These improvements are described in Table 23.

Table 23 : Improved consumption mix data

Material	Improvement achieved
Beet	Proxy carrot replaced by beet data "Beetroot for juice, conventional, at farm gate {FR} U".
Cauliflower	Previously using a mix of conventional and organic production, replaced by conventional production data only.
Lens	Proxy pea replaced by data from Ecoinvent : Lentil {CA-SK} lentil production Cut-off, U - Adapted from Ecoinvent U Lentil {CA-AB} lentil production Cut-off, U - Adapted from Ecoinvent U

	The origins of the consumption mix have also been updated (44% France - approximated by the Canadian inventory, and 56% Canada).
Melon	Previously using a mix of conventional and organic production, replaced by conventional production data only.
Morel	Proxy onion replaced by mushroom data from WFLDB "Agaricus bisporus mushroom, fresh, at plant {NL} - Adapted from WFLDB U".
Mustard	Creation of a consumption mix (100% import from Canada) based on Ecoinvent rapeseed production data "Rape seed {Canada without Quebec} rape seed production Cut-off, U" which has been adapted to better represent mustard production (in particular by replacing the use of glufosinate).
Fishing	Previously using a mix of conventional and organic production, replaced by conventional production data only.
Pear	Previously using a mix of conventional and organic production, replaced by conventional production data only.
Tea	Indian tea production data from the Ecoinvent database (Tea, dried {IN-HP}) tea production, dried Cut-off, U) has been implemented in the tea consumption mix to replace the Sri Lanka proxy used previously (India represents 13.7% of the consumption mix).

5.10. Recipe updates

5.10.1.Improvement of several sweet recipes

Several recipes for sweet products have been updated on the basis of recommendations from Alliance 7, which was able to gather information from its members.

For more information, see the Agribalyse 3.2 methodological report.

The updated recipes are listed in Table 24.

Table 24 : Improved sweet recipes

Recipe name in French	Recipe name	Use in CIQUAL products
Dark chocolate, 40%.	Dark chocolate 40%	31085
White chocolate	White chocolate	31010 31026
Dark chocolate with dried fruit (hazelnuts, almonds, raisins, praline), bar	Dark chocolate with dried fruits	31070
Milk chocolate with dried fruits (hazelnuts, almonds, raisins, praline), bar	Milk chocolate with dried fruits	31018

Dark chocolate, 70%.	Dark chocolate 70%	31080 31005 31074 31030 31072
Sweets, all types	Candies, all types	31003
Caramel candy, soft	Soft caramel candy	31081
Fruit paste	Fruit jelly	31014
Chocolate-flavoured sandwich snack	Cookie (cookie), snack w chocolate filling	24231
Chocolate chip cookie	Cookie (cookie), with chocolate drops	24684
Chocolate butter cookies	Butter cookie (cookie), with chocolate	24017
Traditional Madeleine, pure butter	Madeleine cake, pure butter	24630
Milk chocolate, bar	Milk chocolate	31084 31004 31009 31020 31079
Nougat	Nougat	31033

5.10.2.Improving the mustard recipe

The recipes for mustard and mustard « à l'ancienne » (CIQUAL 11013 and 11021) have been updated to include mustard seeds, based on industry recommendations.

5.10.3.Improving wafer cookie recipe

Recipes for wafer cookie wafer cookie, with chocolate (CIQUAL 24370 and 24371) have been updated based on industry recommendations.

5.10.4.Improving brewed tea recipe

The recipe "Still soft drink with tea extract, flavoured, with sugar" (CIQUAL 18075) has been improved using Open Food Facts data. The amount of tea in the recipe has been reduced from 35.4 g/l to 1.2 g/L.

5.10.5.Correction of an ingredient in the meal replacement recipe

The "Meal replacement low calorie, ready-to-drink" recipe (CIQUAL 42003) used WFLDB's worldwide soybean oil data as an ingredient. This has been replaced by French refined soybean oil data, resulting in a lower impact.

5.10.6. Correction of data used to represent hazelnuts in 3 recipes

In 3 recipes, a proxy was used to represent hazelnuts. This proxy was replaced by the hazelnut shelled "Hazelnut, unshelled, consumption mix {FR} U", resulting in an increase in their impact.

The recipes concerned are :

- Mix of unsalted grains/nuts and dried fruit
- Chocolate spread with hazelnuts, recipe
- Chocolate confectionery, filled with nuts and/or praline

5.10.7. Correction of an ingredient in the recipe Meat, poultry or fish fritters

In this recipe (CIQUAL product 25551) pork was used. It has been replaced by chicken meat. This also affects nugget-type products using this recipe (CIQUAL 36027 and 25512).

5.10.8. Correction of the origin of the milk used in several recipes

Several recipes used milk from around the world. This milk has been replaced by French origin milk, resulting in a lower impact. This applies in particular to the recipes for liégeois au fruit (CIQUAL 39220), yoghurt sauce (CIQUAL 11166), and tandoori sauce (CIQUAL 11202).

5.10.9. Correction to the recipe used for minestrone soup

The minestrone soup data (CIQUAL 25916) used the recipe for pistou soup as a proxy. This has been replaced by the minestrone soup recipe available in the database, resulting in an increase in impact.

5.11. CIQUAL products discontinued

5.11.1. Elimination of products representing bottled water

All products representing bottled water brands have been removed. Only one product representing bottled water (unbranded) has been retained.

All retained/deleted data is listed in Table 25

Table 25 : Bottled water data deleted and retained

Product name	Product name	CIQUAL number	Status
Bottled spring water	Water, bottled	18430	Maintained
Abatilles mineral water, bottled, non-carbonated, low mineralization (Arcachon, 33)	Mineral still water (Abatilles), bottled, lightly mineralized	76000	Deleted
Aix-les-Bains mineral water, bottled, non-carbonated, low mineralization (Aix-les-Bains, 73)	Mineral still water (Aix-les-Bains), bottled, lightly mineralized	76001	Deleted

Aizac mineral water, bottled, sparkling, low mineralization (Aizac, 07)	Mineral sparkling water (Aizac), bottled, lightly mineralized	76002	Deleted
Amanda mineral water, bottled, non-carbonated, highly mineralized (St-Amand, 59)	Mineral still water (Amanda), bottled, strongly mineralized	76004	Deleted
Arcens mineral water, bottled, sparkling, moderately mineralized (Arcens, 07)	Mineral sparkling water (Arcens), bottled, averagely mineralized	76006	Deleted
Ardesy mineral water, bottled, sparkling, highly mineralized (Ardes, 63)	Mineral sparkling water (Ardesy), bottled, strongly mineralized	76007	Deleted
Celtic mineral water, bottled, sparkling or non-carbonated, very low mineral content (Niederbronn, 67)	Mineral still water (Celtic), bottled, very lightly mineralized	76010	Deleted
Chambon mineral water, bottled, non-carbonated, low mineralization (Chambon, 45)	Mineral still water (Chambon), bottled, lightly mineralized	76011	Deleted
Chantemerle mineral water, bottled, non-carbonated, low mineral content (Le Pestrin, 07)	Mineral still water (Chantemerle), bottled, lightly mineralized	76012	Deleted
Chateauneuf mineral water, bottled, sparkling, highly mineralized (Chateauneuf, 63)	Mineral sparkling water (Chateauneuf), bottled, strongly mineralized	76013	Deleted
Chateldon mineral water, bottled, sparkling, highly mineralized (Chateldon, 63)	Mineral sparkling water (Chateldon), bottled, strongly mineralized	76014	Deleted
Clos de l'Abbaye mineral water, bottled, non-carbonated, moderately mineralized (St-Amand, 59)	Mineral still water (Clos de l'Abbaye), bottled, averagely mineralized	76015	Deleted
Contrex mineral water, bottled, non-carbonated, highly mineralized (Contrexéville, 88)	Mineral still water (Contrex), bottled, strongly mineralized	76016	Deleted
Dax mineral water, bottled, non-carbonated, moderately mineralized (Dax, 40)	Mineral still water (Dax), bottled, averagely mineralized	76017	Deleted
Didier mineral water, bottled, sparkling, highly mineralized (Martinique)	Mineral sparkling water (Didier), bottled, strongly mineralized	76018	Deleted
Didier mineral water, bottled non-carbonated, highly mineralized (Martinique)	Mineral still water (Didier), bottled, strongly mineralized	76019	Deleted

Evian mineral water, bottled, non-carbonated, low mineral content (Evian, 74)	Mineral still water (Evian), bottled, lightly mineralized	76020	Deleted
Hépar mineral water, bottled, non-carbonated, highly mineralized (Vittel, 88)	Mineral still water (Hepar), bottled, strongly mineralized	76022	Deleted
Hydroxydase mineral water, bottled, sparkling, highly mineralized (Le Breuil sur Couze, 63)	Mineral sparkling water (Hydroxydase), bottled, strongly mineralized	76023	Deleted
Vernière mineral water, bottled, sparkling, moderately mineralized (Les Aires, 34)	Mineral sparkling water (Verniere), bottled, averagely mineralized	76024	Deleted
Luchon mineral water, bottled, non-carbonated, low mineralization (Luchon, 31)	Mineral still water (Luchon), bottled, lightly mineralized	76025	Deleted
Mont-Roucoux mineral water, bottled, very low mineralization (Lacaune, 81)	Mineral water (Mont-Roucoux), bottled, very lightly mineralized	76027	Deleted
Ogeu spring water, bottled, low mineralization (Ogeu, 64)	Spring water (Ogeu), bottled, lightly mineralized	76028	Deleted
Orée du bois mineral water, bottled, non-carbonated, moderately mineralized (St-Amand, 59)	Mineral still water (Oree du bois), bottled, averagely mineralized	76029	Deleted
Orezza mineral water, bottled, sparkling, moderately mineralized (Rapaggio, 20B)	Mineral sparkling water (Orezza), bottled, averagely mineralized	76030	Deleted
Parot mineral water, bottled, sparkling, moderately mineralized (St-Romain-le-Puy, 42)	Mineral sparkling water (Parot), bottled, averagely mineralized	76031	Deleted
Plancoet mineral water, bottled, sparkling or non-carbonated, low mineralization (Plancoet, 22)	Mineral still water (Plancoet), bottled, lightly mineralized	76032	Deleted
Propiac mineral water, bottled, non-carbonated, highly mineralized (Propiac, 26)	Mineral still water (Propiac), bottled, strongly mineralized	76033	Deleted
Mineral water Puits St-Georges, bottled, sparkling, moderately mineralized (St-Romain-le-Puy, 42)	Mineral sparkling water (Puits St Georges), bottled, averagely mineralized	76034	Deleted
Quézac mineral water, bottled, sparkling, moderately mineralized (Quézac, 48)	Mineral sparkling water (Quezac), bottled, averagely mineralized	76035	Deleted
Mineral water Reine des basaltes, bottled, sparkling, moderately mineralized (Asperjoc, 07)	Mineral sparkling water (Reine des basaltes), bottled, averagely mineralized	76036	Deleted

Rozana mineral water, bottled, sparkling, highly mineralized (Beauregard, 63)	Mineral sparkling water (Rozana), bottled, strongly mineralized	76037	Deleted
Sail-les-Bains mineral water, bottled, non-carbonated, low mineralization (Sail-les-Bains, 42)	Mineral still water (Sail-les-Bains), bottled, lightly mineralized	76038	Deleted
Salvetat mineral water, bottled, sparkling, moderately mineralized (La Salvétat, 34)	Mineral sparkling water (Salvetat), bottled, averagely mineralized	76039	Deleted
St-Amand mineral water, bottled, sparkling or non-carbonated, moderately mineralized (St-Amand, 59)	Mineral still water (St-Amand), bottled, averagely mineralized	76043	Deleted
St-Antonin mineral water, bottled, non-carbonated, highly mineralized (St-Antonin-Noble-Val, 82)	Mineral still water (St-Antonin), bottled, strongly mineralized	76044	Deleted
St-Diéry mineral water, bottled, sparkling, highly mineralized (St-Diéry, 63)	Mineral sparkling water (St-Diery), bottled, strongly mineralized	76046	Deleted
Ste-Marguerite mineral water, bottled, sparkling, moderately mineralized (St-Maurice, 63)	Mineral sparkling water (Ste-Marguerite), bottled, averagely mineralized	76047	Deleted
St-Yorre mineral water, bottled, sparkling, highly mineralized (Saint-Yorre, 03)	Mineral sparkling water (St-Yorre), bottled, strongly mineralized	76049	Deleted
Thonon mineral water, bottled, non-carbonated, low mineralization (Thonon, 74)	Mineral still water (Thonon), bottled, lightly mineralized	76050	Deleted
Ventadour mineral water, bottled, sparkling, low mineral content (Le Pestrin, 07)	Mineral sparkling water (Ventadour), bottled, lightly mineralized	76053	Deleted
Vernet mineral water, bottled, sparkling, low mineralization (Prades, 07)	Mineral sparkling water (Vernet), bottled, lightly mineralized	76054	Deleted
Vichy Célestins mineral water, bottled, sparkling, highly mineralized (Saint-Yorre, 03)	Mineral sparkling water (Vichy Célestins), bottled, strongly mineralized	76055	Deleted
Vittel mineral water, bottled, non-carbonated, moderately mineralized (Vittel, 88)	Mineral still water (Vittel), bottled, averagely mineralized	76056	Deleted
Volvic mineral water, bottled, non-carbonated, low mineral content (Volvic, 63)	Mineral still water (Volvic), bottled, lightly mineralized	76057	Deleted

Active Volvic mineral water, bottled, sparkling, low mineralization (Volvic, 63)	Mineral sparkling water (Volvic active), bottled, lightly mineralized	76058	Deleted
Wattwiller mineral water, bottled, sparkling or non-carbonated, low mineral content (Wattwiller, 68)	Mineral still water (Wattwiller), bottled, lightly mineralized	76059	Deleted
Perrier mineral water, bottled, sparkling, low mineralization (Vergèse, 30)	Mineral sparkling water (Perrier), bottled, lightly mineralized	76060	Deleted
Badoit mineral water, bottled, sparkling, moderately mineralized (St-Galmier, 42)	Mineral sparkling water (Badoit), bottled, averagely mineralized	76061	Deleted
Avra mineral water, bottled, non-carbonated, low mineral content (Greece)	Mineral still water (Avra), bottled, lightly mineralized	76062	Deleted
Beckerich mineral water, bottled, non-carbonated, low mineral content (Luxembourg)	Mineral still water (Beckerich), bottled, lightly mineralized	76063	Deleted
Chaudfontaine mineral water, bottled, non-carbonated, low mineral content (Belgium)	Mineral still water (Chaudfontaine), bottled, lightly mineralized	76065	Deleted
Christinen Brunnen mineral water, bottled, non-carbonated, moderately mineralized (Germany)	Mineral still water (Christinen Brunnen), bottled, averagely mineralized	76066	Deleted
Courmayeur mineral water, bottled, non-carbonated, highly mineralized (Italy)	Mineral still water (Courmayer), bottled, strongly mineralized	76067	Deleted
Levissima mineral water, bottled, non-carbonated, low mineral content (Italy)	Mineral still water (Levissima), bottled, lightly mineralized	76069	Deleted
Luso mineral water, bottled, non-carbonated, very low mineral content (Portugal)	Mineral still water (Luso), bottled, very lightly mineralized	76070	Deleted
Nero mineral water, bottled, non-carbonated, low mineral content (Greece)	Mineral still water (Nero), bottled, lightly mineralized	76071	Deleted
Penacova mineral water, bottled, non-carbonated, very low mineral content (Portugal)	Mineral still water (Penacova), bottled, very lightly mineralized	76072	Deleted
San Bernardo mineral water, bottled, very low mineralization (Italy)	Mineral water (San Bernardo), bottled, very lightly mineralized	76074	Deleted
San Pellegrino mineral water, bottled, sparkling, moderately mineralized (Italy)	Mineral sparkling water (San Pellegrino), bottled, averagely mineralized	76075	Deleted

Spa-Reine mineral water, bottled, sparkling or non-carbonated, moderately mineralized (Belgium)	Mineral still water (Spa-Reine), bottled, averagely mineralized	76076	Deleted
Valvert mineral water, bottled, non-carbonated, low mineral content (Belgium)	Mineral still water (Valvert), bottled, lightly mineralized	76078	Deleted
Appollinaris mineral water, bottled, non-carbonated, highly mineralized (Germany)	Mineral still water (Appollinaris), bottled, strongly mineralized	76079	Deleted
Cristaline spring water, bottled, non-carbonated	Spring still water (Cristaline), bottled	76080	Deleted
Biovive mineral water, bottled, non-carbonated, low mineralization (Dax, 40)	Mineral still water (Biovive), bottled, lightly mineralized	76081	Deleted
La Cairolle mineral water, bottled, non-carbonated, highly mineralized (Les Aires, 34)	Mineral still water (La Cairolle), bottled, strongly mineralized	76082	Deleted
Cilaos mineral water, bottled, sparkling, highly mineralized (Cilaos, 974)	Mineral sparkling water (Cilaos), bottled, strongly mineralized	76083	Deleted
La Française mineral water, bottled, non-carbonated, highly mineralized (Propiac, 26)	Mineral still water (La Francaise), bottled, strongly mineralized	76085	Deleted
Montcalm mineral water, bottled, non-carbonated, very low mineralization (Auzat, 09)	Mineral still water (Montcalm), bottled, very lightly mineralized	76086	Deleted
Montclar mineral water, bottled, non-carbonated, low mineralization (Montclar, 04)	Mineral still water (Montclar), bottled, lightly mineralized	76087	Deleted
Nessel mineral water, bottled, sparkling, moderately mineralized (Soultzmatt, 68)	Mineral sparkling water (Nessel), bottled, averagely mineralized	76088	Deleted
Ogeu mineral water, bottled, sparkling, low mineralization (Ogeu-les-Bains, 64)	Mineral sparkling water (Ogeu), bottled, lightly mineralized	76089	Deleted
Ogeu mineral water, bottled, non-carbonated, low mineralization (Ogeu-les-Bains, 64)	Mineral still water (Ogeu), bottled, lightly mineralized	76090	Deleted
Prince Noir mineral water, bottled, non-carbonated, highly mineralized (St-Antonin-Noble-Val, 82)	Mineral still water (Prince Noir), bottled, strongly mineralized	76091	Deleted
St-Alban mineral water, bottled, sparkling, moderately mineralized (St-Alban, 42)	Mineral sparkling water (St-Alban), bottled, averagely mineralized	76092	Deleted

St-Géron mineral water, bottled, sparkling, moderately mineralized (St-Géron, 43)	Mineral sparkling water (St-Geron), bottled, averagely mineralized	76093	Deleted
Mineral water St-Michel-de-Mourcairol, bottled, sparkling, moderately mineralized (Les Aires, 34)	Mineral sparkling water (St-Michel-de-Mourcairol), bottled, averagely mineralized	76094	Deleted
Treignac mineral water, bottled, non-carbonated, very low mineralization (Treignac, 19)	Mineral still water (Treignac), bottled, very lightly mineralized	76095	Deleted
Vals mineral water, bottled, sparkling, moderately mineralized (Vals-les-Bains, 07)	Mineral sparkling water (Vals), bottled, averagely mineralized	76096	Deleted
Vauban mineral water, bottled, non-carbonated, moderately mineralized (St-Amand-les-Eaux, 59)	Mineral still water (Vauban), bottled, averagely mineralized	76097	Deleted
Carola mineral water, bottled, sparkling or non-carbonated, moderately mineralized (Ribeauville, 68)	Water, mineral, carbonated or non-carbonated, CAROLA	76100	Deleted
Eden mineral water (La Goa), bottled, non-carbonated, low mineral content (Switzerland)	Water, mineral, non-carbonated, EDEN	76102	Deleted
Mont-Blanc mineral water, bottled, non-carbonated, low mineral content (Italy)	Water, mineral, non-carbonated, MONT-BLANC	76101	Deleted

5.11.2. Two obsolete CIQUAL products discontinued

The following 2 products have become obsolete in the CIQUAL database and have been removed from the database.

These data are listed in Table 26.

Table 26 : Data on CIQUAL products deleted as obsolete

Product name	Product name	CIQUAL number	Status
Red label raw beef tenderloin	Beef, sirloin steak, red label, raw	6112	Deleted
Croutons	Croutons	7430	Deleted

5.12. Corrections

5.12.1. Correction of processing procedures for powdered eggs

The data for egg powder, egg white powder and egg yolk powder did not include a process and associated yield. This point has been corrected by adding a dehydration process and a yield to go from

raw ingredient to powder, using information on moisture content from the ANSES CIQUAL database, as for the other dehydrated product data in the database.

This correction increases the impact of CIQUAL's egg powder, egg white powder and egg yolk powder products, as well as 7 vegetarian product recipes that use egg white powder in their recipe.

Data have been corrected as described in Table 27

Table 27 : Correction of powdered egg data

Ingredient	Dehydration process used	Associated yield
Powdered egg	Water evaporated, Drying process, Vacuum rotary, 1 kg water {EN} U	4.1 kg egg / kg egg powder (from 76% to 3% moisture)
Egg yolk powder	Water evaporated, Drying process, Vacuum rotary, 1 kg water {EN} U	2.2 kg egg / kg egg powder (from 55% to 3% moisture)
Egg white powder	Water evaporated, Drying process, Vacuum rotary, 1 kg water {EN} U	7.6 kg egg / kg egg powder (from 88% to 6% moisture)

5.12.2. Correction of water emissions in 1 drying inventory

In the data "Water evaporated, Drying process, Vacuum rotary, 1 kg water {FR} U", water emissions were sent to water. They have been corrected to be sent to air instead, resulting in an increased impact on water.

5.12.3. Correction of water consumption and wastewater generation in a fruit washing process

The water consumption and wastewater generation of the fruit washing process "Washing and sorting for raw fruits with peel, industrial, 1kg of washed and sorted product, processing, at plant {BR} U" was incorrect (negative impact on the Water use indicator). This has been corrected, resulting in an increase in the impact on water.

5.12.4. Correction of water consumption in an alcohol production process

The data item "Ethyl alcohol production, grape marc, 92 %vol, French production mix, at plant, 1 L ethyl alcohol (PGi) {FR} U" had a negative impact on water due to its unbalanced mass balance (input = 0.000941 dm³, output = 0.025m³).

This mass balance has been corrected to match the source data.

5.12.5. Correction of wastewater generation in linseed oil data

In the data for linseed oil production in France "Linseed oil, refined, at oil mill {FR} U", wastewater production was underestimated by a factor of 1000. This value has been corrected, resulting in lower water impacts.

5.12.6. Correction of supply transport unit in rapeseed oil data

In the data representing rapeseed oil (Rapeseed oil, refined, at oil mill {FR} U), seed supply by truck was expressed in tonnes.km instead of kg.km.

This unit has been corrected, resulting in a slight reduction in impact.

5.12.7. Correction of water consumption at retail stage (supermarket) for tubers

For tubers, water consumption at the supermarket stage was underestimated. This has been corrected for 45 products.

The products concerned are listed in Table 28

Table 28 : Products whose water consumption in the Supermarket stage has been corrected

Product name	Product name	CIQUAL number
Beet, cooked	Beetroot, cooked	20003
Beet, raw	Beetroot, raw	20091
Breadfruit, raw	Breadfruit, raw	54500
Carrot, cooked	Carrot, cooked	20008
Carrot, raw	Carrot, raw	20009
Carrot purée	Carrots, puree	20261
Cassava, cooked root	Cassava or manioc, roots, cooked	54034
Cassava, raw root	Cassava or manioc, roots, raw	54031
Celeriac, cooked	Celeriac, cooked	20025
Celeriac, purée	Celeriac, puree	20278
Celeriac, raw	Celeriac, raw	20055
Celery stalks, cooked	Celery stalk, cooked	20024
Celery, raw	Celery stalk, raw	20023
Early potatoes, skinless, boiled/cooked in water	Early potato, boiled/cooked in water, peeled	4029
Jerusalem artichoke, cooked	Jerusalem artichoke, cooked	20050
Jerusalem artichoke, raw	Jerusalem artichoke, raw	20196
New potatoes, raw	New potato, raw	4023
Parsnip, cooked	Parsnip, cooked	20133
Parsnip, raw	Parsnip, raw	20181
Plantain banana, cooked	Plantain banana, cooked	53101
Plantain, raw	Plantain banana, raw	53100
Potato, dehydrated flakes, plain	Potato flakes, dehydrated, plain	4022

Potatoes, boiled/cooked in water	Potato, boiled/cooked in water	4003
Potato, skinless, baked	Potato, peeled, baked	4002
Potato, skinless, raw	Potato, peeled, raw	4008
Potato, roasted/baked	Potato, roasted/baked	4026
Potato, sautéed/fried	Potato, sauteed/pan-fried	4015
Sautéed potatoes with duck fat	Potato, sauteed/pan-fried, with goose fat	4036
Steamed, vacuum-packed potatoes	Potato, steamed, vacuum-packed	4014
Black radish, raw	Radish, black, raw	20089
Red radish, raw	Radish, raw	20045
Rutabaga, cooked	Rutabaga or Swede, cooked	20165
Rutabaga, raw	Rutabaga or Swede, raw	20201
Black salsify, raw	Salsify, black, raw	20197
Salsify, cooked	Salsify, cooked	20046
Sweet potato, cooked	Sweet potato, cooked	4102
Sweet potato, raw	Sweet potato, raw	4101
Tapioca or Japanese pearls, raw	Tapioca, raw	4000
Taro, tuber, cooked	Taro, tuber, cooked	53201
Taro, tuber, raw	Taro, tuber, raw	53200
Turnip, cooked	Turnip, cooked	20033
Turnip, peeled, raw	Turnip, peeled, raw	20064
Ware potatoes, skinless, boiled/cooked in water	Ware potato, boiled/cooked in water, peeled	4028
Yam, peeled, boiled/boiled in water	Yam or Indian potato, peeled, boiled/cooked in water	53503
Yam, peeled, raw	Yam or Indian potato, peeled, raw	53502

5.12.8. Correction of inedible part ratios for several products

The ratios of inedible parts have been adapted in several stages for several products.

All corrections are listed in Table 29

Table 29 : Corrections to the percentages of inedible parts considered for several products

Product concerned	Stage concerned	Correction made
European pilchard or sardine, fillets without fishbone, in olive oil, canned, drained	At packaging	At the "at packaging" stage elimination of a non-edible loss ratio→ reduced impact
European pilchard or sardine, in oil, canned, drained	At packaging	At the "at packaging" stage elimination of a non-edible loss ratio→ reduced impact
European pilchard or sardine, in tomato sauce, canned, drained	At packaging	At the "at packaging" stage elimination of a non-edible loss ratio→ reduced impact
Mackerel, canned in brine, drained	At packaging	At the "at packaging" stage elimination of a non-edible loss ratio→ reduced impact
Mackerel, fillet, in mustard sauce, canned, drained	At packaging	At the "at packaging" stage elimination of a non-edible loss ratio→ reduced impact
Mackerel, fillet, in tomato sauce, canned, drained	At packaging	At the "at packaging" stage elimination of a non-edible loss ratio→ reduced impact
Pilchard, in tomato sauce, canned, drained	At packaging	At the "at packaging" stage elimination of a non-edible loss ratio→ reduced impact
Sesame seed	At consumer	At the "at consumer" stage correction of a non-edible loss ratio→ lower impact
Artichoke, globe, raw	At consumer	At the "at consumer" stage correction of a non-edible loss ratio→ lower impact
Prepared mixed tuna and vegetable salad, canned, drained	At consumer	At the "at consumer" stage correction of a non-edible loss ratio→ lower impact
Prepared mixed meat/fish canned, drained salad	At consumer	At the "at consumer" stage correction of a non-edible loss ratio→ lower impact
Tuna, plain, canned, drained	At consumer	At the "at consumer" stage correction of a non-edible loss ratio→ lower impact
Asparagus, canned, drained	At consumer	At the "at consumer" stage correction of a non-edible loss ratio→ lower impact
Norway lobster, raw	At consumer	At the "at consumer" stage correction of a non-edible loss ratio→ lower impact
Shrimp, fillet, raw, frozen	At processing	Harmonization of inedible parts for shrimp: set at 55% for all shrimp products.
Shrimp or prawn, raw	At consumer	Harmonization of inedible parts for shrimp: set at 55% for all shrimp products.
Shrimp or prawn, cooked	At consumer	Harmonization of inedible parts for shrimp: set at 55% for all shrimp products.

Deep water pink shrimp, raw	At consumer	Harmonization of inedible parts for shrimp: set at 55% for all shrimp products.
Shrimp, frozen, raw	At consumer	Harmonization of inedible parts for shrimp: set at 55% for all shrimp products.
Saithe, fillet, raw, frozen	At processing	Harmonization of the inedible parts of saithe between the filleting process with and without deep-freezing→ increased impact on the deep-frozen product.
Pork, shoulder, cooked	At consumer	Correction of the inedible part at the consumer: increased from 1 to 20% to take account of boning→ increase in impact.
Pork, shoulder, raw	At consumer	Correction of the inedible part at the consumer's: increased from 1 to 20% to take account of boning→ increased impact.
Coppa	At consumer	Removal of inedible part ratio (previously 20%)→ lower impact
Dry-cured ham, fat and rind removed	At consumer	Removal of inedible part ratio (previously 20%)→ lower impact
Dry-cured ham	At consumer	Removal of inedible part ratio (previously 20%)→ lower impact
Pancetta, dried	At consumer	Removal of inedible part ratio (previously 20%)→ lower impact
Parma dry-cured ham	At consumer	Removal of inedible part ratio (previously 20%)→ lower impact
Serrano dry-cured ham	At consumer	Removal of inedible part ratio (previously 20%)→ lower impact
Braised ham on the bone	At consumer	Removal of inedible part ratio (previously 20%)→ lower impact
Knuckle of ham, cooked	At consumer	Removal of inedible part ratio (previously 20%)→ lower impact
Round of ham, cooked	At consumer	Removal of inedible part ratio (previously 20%)→ lower impact

5.12.9.Added cooking time for cooked shrimp at the consumer's premises

The product "shrimp, cooked" (CIQUAL 10007) did not include consumer cooking. This has been corrected by adding a pan-frying process at the consumer's premises.

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ACRONYMS AND ABBREVIATIONS

LCA	Lifecycle analysis
ADEME	French Environment and Energy Management Agency
LCI	Life cycle inventory
OWP	Organic waste products

APPENDICES

Appendix1 : list of LCIs concerned by the correction of land use flows for Agribalyse crops under shelter

Cauliflower seedling for summer crop, conventional, at production site {FR} U
Cauliflower seedling for winter crop, conventional, at production site {FR} U
Cauliflower seedling for winter crop, organic, at production site {FR} U
Tomato, seedling for heated crop, conventional (phase), at production site {FR} U
Lettuce, seedling for autumn crop, conventional, at production site {FR} U
Lettuce, seedling for winter crop, conventional, at production site {FR} U
Melon, seedling for crop under low tunnel, conventional, at production site {FR} U
Melon, seedling for open field crop, conventional, at production site {FR} U
Melon, seedling for protected crop, conventional, at production site {FR} U
Melon, seedling, organic, at production site {FR} U
Rose (cut flower), soilless, heated and enlightened, conventional pest management, at greenhouse {FR} U
Rose (cut flower), soilless, heated and enlightened, integrated pest management, at greenhouse {FR} U
Rose (cut flower), soilless, low-heated, conventional pest management, at greenhouse {FR} U
Rose (cut flower), soilless, low-heated, integrated pest management, at greenhouse {FR} U
Tomato, average basket, conventional, heated greenhouse, national average, at greenhouse {FR} U
Tomato, conventional, new closed glasshouse, unavoidable energy and biomass, no liquid CO2, runoff recycling, at farm gate {FR} U
Tomato, conventional, new closed glasshouse, unavoidable energy and biomass, runoff recycling, at farm gate {FR} U
Tomato, conventional, new glasshouse, biomass and natural gas, runoff recycling, at farm gate {FR} U
Tomato, conventional, new glasshouse, natural gas, no runoff recycling, at farm gate {FR} U
Tomato, conventional, new glasshouse, natural gas, no runoff recycling, with water footprint, at farm gate {FR} U
Tomato, conventional, new glasshouse, natural gas, runoff recycling, at farm gate {FR} U
Tomato, conventional, new glasshouse, natural gas, runoff recycling, with water footprint, at farm gate {FR} U
Tomato, conventional, new glasshouse, unavoidable energy and natural gas, runoff recycling, at farm gate {EN} U
Tomato, conventional, old glasshouse, natural gas, no runoff recycling, at farm gate {FR} U
Tomato, medium size, conventional, heated greenhouse, at greenhouse {FR} U
Tomato, seedling (phase), conventional, soil based prod. national average, at production site {FR} U
Tomato, seedling (phase), conventional, soilless production, national average, at production site {FR} U

Tomato, seedling (phase), organic, soil based prod., national average, at production site {FR} U
Zucchini, seedling for autumn protected crop, conventional, at production site {FR} U
Zucchini, seedling for springtime protected crops, conventional, at production site {FR} U
Zucchini, seedling for sprintime protected crop, organic, at production site {FR} U
Leek, early seedling, conventional, at production site {MA} U
Lettuce, autumn under tunnel, conventional, at farm gate {FR} U
Lettuce, winter under tunnel, conventional, at farm gate {FR} U
Strawberry, misted tip plant for open field crops, conventional, at production site {FR} U
Strawberry, soil protected crops, non-heated, conventional, at farm gate {FR} U
Strawberry, soilless protected crops, frost protection, conventional, at farm gate {FR} U
Strawberry, soilless protected crops, heated, conventional, at farm gate {FR} U
Strawberry, soilless protected crops, non-heated, conventional, at farm gate {FR} U
Strawberry, tray plants, for soilless frost-protected crops, conventional, at production site {FR} U
Strawberry, tray plants, for soilless heated crops, conventional, at production site {FR} U
Strawberry, tray plants, for soilless non heated crops, conventional, at production site {FR} U
Tomato, average basket, conventional, soil based, non-heated greenhouse, at greenhouse {FR} U
Tomato, medium size, conventional, soil based, non-heated greenhouse, at greenhouse {FR} U
Tomato, organic, greenhouse production, national average, at greenhouse {FR} U
Cauliflower seed, conventional, at production site {FR} U
Leek, seeds, conventional, at production site {FR} U
Lettuce, seed, conventional, at production site {FR} U
Melon, protected crop, conventional, at farm gate {FR} U
Melon, seed, conventional, at production site {FR} U
Zucchini, autumn, under tunnel, conventional, at farm gate {FR} U
Zucchini, seeds, conventional, at farm gate {FR} U
Zucchini, springtime, under tunnel, conventional, at farm gate {FR} U
Zucchini, springtime, under tunnel, organic, at farm gate {FR} U

Appendix2 : List of organic waste product (OWP) LCIs updated in AGRIBALYSE 3.2

Inventory name	OWP type	Status
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Average compost, from green waste, biowaste, sludge, manure, slurry (amendment), allocation cut-off on process {RER} U	Compost	modified by the update
Biowaste, shredded {RER} U	Compost	retained and aligned with the update
Compost, of biowaste and green waste 50-50 (amendment), allocation cut-off on process {RER} U	Compost	modified by the update
Compost, of biowaste and green waste 90-10 (amendment), allocation cut-off on process {RER} U	Compost	modified by the update
Compost, of green waste (amendment), allocation cut-off on process {RER} U	Compost	new inventory following update
Compost, of green waste and straw 50-50 (amendment), allocation cut-off on process {RER} U	Compost	modified by the update
Compost, of sludge and green waste 53-47 (amendment), allocation cut-off on process {RER} U	Compost	modified by the update
Compost, of solid fraction of digestate from manure and green waste (amendment), allocation cut-off on process {RER} U	Compost	modified by the update
Compost, of solid fraction of slurry (amendment), allocation cut-off on process {RER} U	Compost	modified by the update
Compost, of swine slurry and straw 71-29 (amendment), allocation cut-off on process {RER} U	Compost	modified by the update
Green waste and straw, shredded {RER} U	Compost	retained and aligned with the update
Green waste, shredded {RER} U	Compost	new inventory following update
Straw, shredded {RER} U	Compost	new inventory following update
Agricultural digestate, stocked in silo (fertilizer), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Average agricultural digestate (fertilizer), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Average digestate, from manure and maize silage (fertilizer), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Average digestate, from manure and slurry (fertilizer), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Biogas, from anaerobic digestion of biowaste, allocation cut-off on process {RER} U	Digestate	modified by the update
Biogas, from anaerobic digestion of cattle slurry, allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Biogas, from anaerobic digestion of maize silage, allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Biogas, from anaerobic digestion of manures mix, allocation cut-off on process {RER} U	Digestate	retained and aligned with the update

Biogas, from anaerobic digestion of swine slurry and maize silage (33%), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Biogas, from anaerobic digestion of swine slurry and maize silage (67%), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Biogas, from anaerobic digestion of swine slurry, allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Digestate, from anaerobic digestion of biowaste (fertilizer), allocation cut-off on process {RER} U	Digestate	modified by the update
Digestate, from anaerobic digestion of cattle slurry (fertilizer), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Digestate, from anaerobic digestion of maize silage (fertilizer), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Digestate, from anaerobic digestion of manure and slurry mix (fertilizer), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Digestate, from anaerobic digestion of swine slurry (fertilizer), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Digestate, from anaerobic digestion of swine slurry and maize silage (33%) (fertilizer), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Digestate, from anaerobic digestion of swine slurry and maize silage (67%) (fertilizer), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
K fertiliser, from liquid fraction of digestate, from manure and crops, ammonia stripped (fertilizer), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Liquid fraction of digestate, from manure and crops, dewatered by centrifugation (fertilizer), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Maize silage, shredded, allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Mineral concentrate, from liquid fraction of digestate, from manure and crops, ammonia stripped (fertilizer), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Raw and solid fraction of digestate 70-80%DM, from manure and crops, thermally dried (fertilizer), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Solid fraction of digestate 20-30%DM, from manure and crops, dewatered by centrifugation (amendment), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Solid fraction of digestate 90%DM, from manure and crops, ammonia stripped, thermally dried (fertilizer), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update

Solid fraction of digestate 90%DM, from manure and crops, thermally dried and pelletised (amendment), allocation cut-off on process {RER} U	Digestate	retained and aligned with the update
Biological sludge, 20%DM, from aerobic treatment of slurry (fertilizer), allocation cut-off on process {RER} U	Effluents	Modification of water flows only
Droppings, 85%DM, from poultry manure, thermally dried, allocation cut-off on process {RER} U	Effluents	new inventory following update
Final effluent, from aerobic treatment of slurry (for irrigation), allocation cut-off on process {RER} U	Effluents	Modification of water flows only
K fertiliser, from liquid fraction of slurry, ammonia stripped (fertilizer), allocation cut-off on process {RER} U	Effluents	retained and aligned with the update
Liquid fraction of raw slurry, dewatered by centrifugation (fertilizer), allocation cut-off on process {RER} U	Effluents	retained and aligned with the update
Manure and solid fraction of slurry, thermally dried (amendment), allocation cut-off on process {RER} U	Effluents	retained and aligned with the update
Manure, from cattle, for direct spreading (amendment), allocation cut-off on process {RER} U	Effluents	new inventory following update
Manure, from cattle, stocked in concrete surface or pit (amendment), allocation cut-off on process {RER} U	Effluents	retained and aligned with the update
Manure, from poultry, for direct spreading (fertilizer), allocation cut-off on process {RER} U	Effluents	new inventory following update
Manure, from poultry, stocked in concrete surface or pit (fertilizer), allocation cut-off on process {RER} U	Effluents	retained and aligned with the update
Manure, from swine, for direct spreading (amendment), allocation cut-off on process {RER} U	Effluents	new inventory following update
Manure, from swine, stocked in heap (amendment), allocation cut-off on process {RER} U	Effluents	retained and aligned with the update
Manure, mix, stocked in concrete surface or pit (amendment), allocation cut-off on process {RER} U	Effluents	retained and aligned with the update
Mineral concentrate, from liquid fraction of slurry, ammonia stripped (fertilizer), allocation cut-off on process {RER} U	Effluents	retained and aligned with the update
Slurry, from cattle, average, stocked in silo and concrete pit (fertilizer), allocation cut-off on process {RER} U	Effluents	new inventory following update
Slurry, from cattle, for direct spreading (fertilizer), allocation cut-off on process {RER} U	Effluents	new inventory following update
Slurry, from cattle, stocked in concrete pit (fertilizer), allocation cut-off on process {RER} U	Effluents	retained and aligned with the update
Slurry, from cattle, stocked in silo (fertilizer), allocation cut-off on process {RER} U	Effluents	retained and aligned with the update

Slurry, from swine, average, stocked in silo and concrete pit (fertilizer), allocation cut-off on process {RER} U	Effluents	new inventory following update
Slurry, from swine, for direct spreading (fertilizer), allocation cut-off on process {RER} U	Effluents	new inventory following update
Slurry, from swine, stocked in concrete pit (fertilizer), allocation cut-off on process {RER} U	Effluents	retained and aligned with the update
Slurry, from swine, stocked in silo (fertilizer), allocation cut-off on process {RER} U	Effluents	retained and aligned with the update
Slurry, mix, stocked in concrete pit (fertilizer), allocation cut-off on process {RER} U	Effluents	retained and aligned with the update
Slurry, mix, stocked in silo (fertilizer), allocation cut-off on process {RER} U	Effluents	retained and aligned with the update
Solid fraction of raw slurry 30-50%DM, dewatered by centrifugation (amendment), allocation cut-off on process {RER} U	Effluents	retained and aligned with the update
Solid fraction of slurry 90%DM, ammonia stripped, thermally dried (fertilizer), allocation cut-off on process {RER} U	Effluents	retained and aligned with the update
Cocoa shells, processed, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Coffee residue, processed, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Compost, for organic fertiliser, shredded, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Compost, of manure and agroindustrial residues (for organic fertiliser) (amendment), allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Olive pomace, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Olive pomace, processed, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Organic amendment, <3% N, bulk, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Organic amendment, <3% N, granulate, packaged, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Organic fertiliser, >3% N, bulk, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Organic fertiliser, >3% N, granulate, packaged, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Organic fertiliser, 3-2-3, bulk, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update

Organic fertiliser, 3-2-3, granulate, packaged, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Organic fertiliser, 7-6-8, bulk, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Organic fertiliser, 7-6-8, granulate, packaged, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Organic fertiliser, average, granulate, packaged, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Organo-mineral fertiliser, 11-4-12, bulk, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Organo-mineral fertiliser, 11-4-12, granulate, packaged, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Organo-mineral fertiliser, 5-5-10, bulk, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Organo-mineral fertiliser, 5-5-10, granulate, packaged, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Organo-mineral fertiliser, 6-3-10, bulk, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Organo-mineral fertiliser, 6-3-10, granulate, packaged, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Processed residues from agrifood industries, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Rendered animal by-products (fertilizer), allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Wool residues, from scouring of greasy wool, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Wool residues, from skirting of greasy wool, allocation cut-off on process {RER} U	Commercial fertilizers	retained and aligned with the update
Excretion during grazing, as K ₂ O {FR} U	Other	retained and aligned with the update
Excretion during grazing, as N {FR} U	Other	retained and aligned with the update
Excretion during grazing, as P ₂ O ₅ {FR} U	Other	retained and aligned with the update
Horn meal, at regional storehouse {FR} U	Other	retained and aligned with the update
Biogas, from anaerobic digestion of sewage sludge, water balanced {RER} U	Sludge	Modification of water flows only
Sludge, 1-7%DM, from wastewater treatment, stocked in silo (processing level 1) {RER} U	Sludge	retained and aligned with the update
Sludge, 22-33%DM, average of dewatering technologies, water balanced (processing level 4) {RER} U	Sludge	Modification of water flows only

Sludge, 22-80%DM, from wastewater treatment, stocked in concrete surface (processing level 6) {RER} U	Sludge	retained and aligned with the update
Sludge, 22%DM, from wastewater treatment, dewatered by bed filter, water balanced (processing level 4) {RER} U	Sludge	Modification of water flows only
Sludge, 23%DM, from wastewater treatment, dewatered by centrifugation, water balanced (processing level 4) {RER} U	Sludge	Modification of water flows only
Sludge, 25%DM, from wastewater treatment, stabilised by liming, water balanced (processing level 3) {RER} U	Sludge	Modification of water flows only
Sludge, 3-5%DM, average of digestion technologies, water balanced (processing level 3) {RER} U	Sludge	Modification of water flows only
Sludge, 3%DM, from wastewater treatment, chemically conditioned, water balanced (processing level 3) {RER} U	Sludge	Modification of water flows only
Sludge, 3%DM, from wastewater treatment, stabilised by aerobic digestion, water balanced (processing level 3) {RER} U	Sludge	Modification of water flows only
Sludge, 3%DM, from wastewater treatment, stabilised by anaerobic digestion, water balanced (processing level 3) {RER} U	Sludge	Modification of water flows only
Sludge, 33%DM, from wastewater treatment, dewatered by press filter, water balanced (processing level 4) {RER} U	Sludge	Modification of water flows only
Sludge, 4-6%DM, average of thickening technologies, water balanced (processing level 2) {RER} U	Sludge	Modification of water flows only
Sludge, 4%DM, from wastewater treatment, thickened by flotation, water balanced (processing level 2) {RER} U	Sludge	Modification of water flows only
Sludge, 4%DM, from wastewater treatment, thickened by gravitation, water balanced (processing level 2) {RER} U	Sludge	Modification of water flows only
Sludge, 6%DM, from wastewater treatment, thickened by dewatering table, water balanced (processing level 2) {RER} U	Sludge	Modification of water flows only
Sludge, 80%DM, from wastewater treatment, solar dried, water balanced (processing level 5) {RER} U	Sludge	Modification of water flows only
Sludge, 90%DM, from wastewater treatment, thermally dried, water balanced (processing level 5) {RER} U	Sludge	Modification of water flows only
Sludge, average of dried sludge 80-90%DM, allocation cut-off on process {RER} U	Sludge	modified by the update
Sludge, limed (amendment), allocation cut-off on process {RER} U	Sludge	modified by the update

Sludge, thickened (fertilizer), allocation cut-off on process {RER} U	Sludge	modified by the update
Sludge, thickened and dewatered (fertilizer), allocation cut-off on process {RER} U	Sludge	modified by the update
Sludge, thickened, anaerobically digested and centrifuged (amendment), allocation cut-off on process {RER} U	Sludge	modified by the update
Sludge, thickened, anaerobically digested, centrifuged and limed (amendment), allocation cut-off on process {RER} U	Sludge	modified by the update
Sludge, thickened, anaerobically digested, centrifuged and thermally dried (amendment), allocation cut-off on process {RER} U	Sludge	modified by the update
Sludge, thickened, and anaerobically digested (amendment), allocation cut-off on process {RER} U	Sludge	modified by the update
Sludge, thickened, centrifuged and solar dried (fertilizer), allocation cut-off on process {RER} U	Sludge	modified by the update
Sludge, thickened, centrifuged and thermally dried (fertilizer), allocation cut-off on process {RER} U	Sludge	modified by the update
Sludge, thickened, dewatered and thermally dried (fertilizer), allocation cut-off on process {RER} U	Sludge	modified by the update
Treatment of biowaste, anaerobic digestion, allocation cut-off on process {RER} U	Digestate / Treatment	new inventory following update
Treatment of biowaste, co-composting biowaste-greenwaste 50-50, allocation cut-off on process {RER} U	Compost / Treatment	new inventory following update
Treatment of biowaste, co-composting biowaste-greenwaste 90-10, allocation cut-off on process {RER} U	Compost / Treatment	new inventory following update
Treatment of green waste, co-composting biowaste-greenwaste 50-50, allocation cut-off on process {RER} U	Compost / Treatment	new inventory following update
Treatment of green waste, co-composting biowaste-greenwaste 90-10, allocation cut-off on process {RER} U	Compost / Treatment	new inventory following update
Treatment of green waste, co-composting greenwaste-solid fraction of digestate from manure 10-90, allocation cut-off on process {RER} U	Compost / Treatment	new inventory following update
Treatment of green waste, co-composting greenwaste-solid fraction of slurry 3-97, allocation cut-off on process {RER} U	Compost / Treatment	new inventory following update
Treatment of green waste, co-composting greenwaste-straw 50-50, allocation cut-off on process {RER} U	Compost / Treatment	new inventory following update
Treatment of green waste, unmixed composting, allocation cut-off on process {RER} U	Compost / Treatment	new inventory following update

Treatment of greenwaste, co-composting sludge-greenwaste 53-47, allocation cut-off on process {RER} U	Compost / Treatment	new inventory following update
Treatment of sludge, includ. conditioning, allocation cut-off on process {RER} U	Sludge / Treatment	new inventory following update
Treatment of sludge, wo conditioning, allocation cut-off on process {RER} U	Sludge / Treatment	new inventory following update
Average compost, from green waste, biowaste, sludge, manure, slurry (amendment), burden on downstream {RER} U	Compost	retained but not used because not aligned with update
Compost, of biowaste (amendment), burden on downstream {RER} U	Compost	retained but not used because not aligned with update
Compost, of biowaste and green waste (amendment), burden on downstream {RER} U	Compost	retained but not used because not aligned with update
Compost, of green waste (amendment), burden on downstream {RER} U	Compost	retained but not used because not aligned with update
Compost, of sludge and green waste (amendment), burden on downstream {RER} U	Compost	retained but not used because not aligned with update
Compost, of solid fraction of digestate from manure and green waste (amendment), burden on downstream {RER} U	Compost	retained but not used because not aligned with update
Compost, of solid fraction of slurry (amendment), burden on downstream {RER} U	Compost	retained but not used because not aligned with update
Compost, of swine slurry and straw (amendment), burden on downstream {RER} U	Compost	retained but not used because not aligned with update
Biogas, from anaerobic digestion of biowaste, burden on downstream {RER} U	Digestate	retained but not used because not aligned with update
Digestate, from anaerobic digestion of biowaste (fertilizer), burden on downstream {RER} U	Digestate	retained but not used because not aligned with update
Sludge, limed (amendment), burden on downstream {RER} U	Sludge	retained but not used because not aligned with update
Sludge, thickened (fertilizer), burden on downstream {RER} U	Sludge	retained but not used because not aligned with update
Sludge, thickened and dewatered (fertilizer), burden on downstream {RER} U	Sludge	retained but not used because not aligned with update
Sludge, thickened, anaerobically digested and centrifuged (amendment), burden on downstream {RER} U	Sludge	retained but not used because not aligned with update
Sludge, thickened, anaerobically digested, centrifuged and limed (amendment), burden on downstream {RER} U	Sludge	retained but not used because not aligned with update
Sludge, thickened, anaerobically digested, centrifuged and thermally dried (amendment), burden on downstream {RER} U	Sludge	retained but not used because not aligned with update

Sludge, thickened, and anaerobically digested (amendment), burden on downstream {RER} U	Sludge	retained but not used because not aligned with update
Sludge, thickened, centrifuged and solar dried (fertilizer), burden on downstream {RER} U	Sludge	retained but not used because not aligned with update
Sludge, thickened, centrifuged and thermally dried (fertilizer), burden on downstream {RER} U	Sludge	retained but not used because not aligned with update
Sludge, thickened, dewatered and thermally dried (fertilizer), burden on downstream {RER} U	Sludge	retained but not used because not aligned with update

ADEME IN BRIEF

At ADEME - the French Environment and Energy Management Agency - we are resolutely committed to combating global warming and resource degradation.

On all fronts, we are mobilizing citizens, economic players and regions, giving them the means to move towards a resource-efficient, low-carbon, fairer and more harmonious society.

In all areas - energy, circular economy, food, mobility, air quality, adaptation to climate change, soil... - we advise, facilitate and help finance numerous projects, from research to sharing solutions.

At every level, we put our expertise and foresight at the service of public policy.

ADEME is a public establishment under the authority of the Ministry of Ecological Transition and the Ministry of Higher Education, Research and Innovation.

ADEME COLLECTIONS



FACTS & FIGURES

ADEME, the French Environment and Energy Management Agency, provides objective analyses based on regularly updated indicators.



KEYS TO ACTION

ADEME facilitator: ADEME draws up practical guides to help players implement their projects methodically and/or in compliance with regulations.



THEY DID IT

ADEME catalyst: players share their experiences and know-how.



EXPERTISE

ADEME expert: reporting on the results of research, studies and collective projects carried out under its supervision.



HORIZONS

ADEME looks to the future: it offers a forward-looking, realistic vision of the challenges of energy and ecological transition, for a desirable future that we can build together.



AGRIBALYSE 3 - Change report 3.1.1/3.2

AGRIBALYSE 3 is a French database of life cycle inventories (LCI) for agricultural products and food consumption. It is produced as part of the AGRIBALYSE program, run since 2009 by ADEME and INRAE, with the support of numerous organizations and experts. Since 2021, AGRIBALYSE has been updated with the support and expertise of the members of the REVALIM Scientific Interest Group (ADEME, INRAE, ACTA, ACTIA).

AGRIBALYSE provides LCIs for 2,500 food products registered in CIQUAL, the national nutritional database (ANSES, 2017). Each food has a similar identification number and limits, enabling consistent links to be made between nutritional and environmental properties.

In September 2024, AGRIBALYSE 3.2 was released as the successor to AGRIBALYSE 3.1.1. This report describes the changes that have been made, leading up to the release of AGRIBALYSE 3.2.

