

# Agribalyse 3.1.1 in openLCA



Software version: openLCA 2.0.4

Report version: 1.0

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## 1 Agribalyse 3.1.1 for openLCA

Agribalyse is a French database with a focus on food products, developed and provided by ADEME, since quite some time. It is available from <https://doc.agribalyse.fr/documentation-en/agribalyse-data/data-access>.

Agribalyse is initially developed in SimaPro; earlier versions were available as a SimaPro csv file which could be imported into SimaPro and also openLCA, nowadays, with the 3.1.1 version, the SimaPro version is only available from PRé consultants, the developers of SimaPro, as an installation file in SimaPro, requiring a SimaPro license, and the download form from PRé requires users to state that they indeed possess a valid license of at least SimaPro 9.

For openLCA, ADEME shared a SimaPro csv version for the import.

Agribalyse contains datasets from ADEME projects about food, but also datasets from the Quantis World Food database, and from ecoinvent. This can be seen from the different product name patterns in the database, and it is also reflected in slightly different approaches for modelling water for example.

For the conversion to openLCA, the following steps were taken:

- Adding metadata that is lost in SimaPro (locations, especially, so that openLCA can show results on maps)
- Retrieving data quality from the SimaPro description, where it is in SimaPro stored for documentation but cannot be actively used; this is now possible in openLCA (although in the Agribalyse database, not many processes contain data quality information)
- Mapping flows to the openLCA flows from SimaPro, so that Agribalyse can be used together with the openLCA LCIA methods
- Flow and process names were stripped from the SimaPro metadata (locations, units some times) since this is not needed in openLCA
- Results were tested against SimaPro

Some aspects in Agribalyse were not addressed, these include:

- In the SimaPro version, some allocation factors are slightly off, i.e. not 1. This is wrong, but this is as it is in the original database. You see this when validating the database in openLCA.

Data set	Message
Units of currency	⚠ duplicate unit name or synonym: \$
Units of area	⚠ duplicate unit name or synonym: a
Picodon cheese production, from goat's milk, soft cheese, French production mix, at plant, 1 kg of soft cheese (FR) U - FR	⚠ allocation factors do not sum up to 1
Palm oil, refined, processed in EU, at plant - RER	⚠ allocation factors do not sum up to 1
Wheat flour, at industrial mill - Adapted from WFLDB - GLO	⚠ allocation factors do not sum up to 1
Saint-Marcellin cheese production, from cow's milk, soft cheese, French production mix, at plant, 1 kg of Saint-Marcellin ...	⚠ allocation factors do not sum up to 1
Causses blue cheese production, from cow's milk, soft cheese, French production mix, at plant, 1 kg of Causses blue chee...	⚠ allocation factors do not sum up to 1
Dairy fat 25% fat, light, spreadable, unsalted, at dairy - Adapted from WFLDB - RER	⚠ allocation factors do not sum up to 1
Feta cheese production, from ewe's milk, soft cheese, French production mix, at plant, 1 kg of soft cheese (FR) U - FR	⚠ allocation factors do not sum up to 1
Auvergne blue cheese production, from cow's milk, soft cheese, French production mix, at plant, 1 kg of Auvergne soft c...	⚠ allocation factors do not sum up to 1
Bresse blue cheese, reduced fat, around 15% fat production, from cow's milk, soft cheese, French production mix, at plan...	⚠ allocation factors do not sum up to 1
Grinding and Forming, of frozen beef trimming, industrial production, French production mix, at plant, 1 kg of ground be...	⚠ allocation factors do not sum up to 1
Uncured soft cheese, spreadable, around 30-40% fat, cheese production, from cow's milk, soft cheese, French production ...	⚠ allocation factors do not sum up to 1
Vacherin cheese or Mont d'or cheese production, from cow's milk, soft cheese, French production mix, at plant, 1 kg of V...	⚠ allocation factors do not sum up to 1
Soft-ripened cheese with bloomy rind, Camembert-type cheese production, from goat's milk, soft cheese, French produc...	⚠ allocation factors do not sum up to 1
Pont l'Eveque cheese production, from cow's milk, soft cheese, French production mix, at plant, 1 kg of Pont l'Eveque typ...	⚠ allocation factors do not sum up to 1
Dairy fat 20% fat, light, spreadable, unsalted, unsalted, at dairy - Adapted from WFLDB - RER	⚠ allocation factors do not sum up to 1
Pyrenees cheese production, from ewe's milk, hard cheese, French production mix, at plant, 1 kg of hard cheese (FR) U - FR	⚠ allocation factors do not sum up to 1
Sainte Maure cheese production, from goat's milk, soft cheese, French production mix, at plant, 1 kg of soft cheese (FR) U...	⚠ allocation factors do not sum up to 1
Cheese production, from goat's milk, hard cheese, French production mix, at plant, 1 kg of hard cheese (FR) U - FR	⚠ allocation factors do not sum up to 1
Uncured soft cheese, spreadable, around 25% fat, cheese production, from cow's milk, soft cheese, French production mi...	⚠ allocation factors do not sum up to 1
Crottin cheese production, from goat's milk, soft cheese, French production mix, at plant, 1 kg of soft cheese (FR) U - FR	⚠ allocation factors do not sum up to 1
Cheese, fresh production, from goat's milk, soft cheese, French production mix, at plant, 1 kg of soft cheese (FR) U - FR	⚠ allocation factors do not sum up to 1
Soft-ripened round cheese with bloomy rind, around 5% fat, Camembert-type cheese, reduced fat, cheese production, fr...	⚠ allocation factors do not sum up to 1
Chaource cheese production, from cow's milk, soft cheese, French production mix, at plant, 1 kg of Chaource soft cheese...	⚠ allocation factors do not sum up to 1
Butter, light, 39-41% fat, unsalted, at dairy - Adapted from WFLDB - RER	⚠ allocation factors do not sum up to 1
Cheese, semi-dry production, from goat's milk, hard cheese, French production mix, at plant, 1 kg of hard cheese (FR) U - ...	⚠ allocation factors do not sum up to 1
Southern oil, at oil mill - Adapted from WFLDB - IIS	⚠ allocation factors do not sum up to 1

**Allocation: Bresse blue cheese, reduced fat, around 15% fat production, from cow's milk, soft cheese, French production mix, at plant, 1 kg of Bresse blue soft cheese FR**

Default method: Physical Calculate factors

Physical & economic allocation

Product	Physical	Economic
Bresse blue cheese, reduced fat, around 15% fat production, from co...	0.606	0.606
Bresse blue cheese, reduced fat, around 15% fat production, from co...	0.00131	0.00131
Bresse blue cheese, reduced fat, around 15% fat production, from co...	0.0326	0.0326
Bresse blue cheese, reduced fat, around 15% fat production, from co...	0.34600000000000003	0.34600000000000003
Bresse blue cheese, reduced fat, around 15% fat production, from co...	0.014199999999999999	0.014199999999999999
Σ	1.00011	1.00011

Causal allocation

Flow	Direction	Category	Amount	oft cheese, Fi	's milk, soft c	milk, soft ch	's milk, soft c	soft cheese,	Σ
Tap water (GLO) market group for   Cut-off,...	Input	Others/Copied from ...	8.81000 kg	0.606	0.00131	0.0326	0.34600000...	0.01419999...	1.00011
Calcium chloride (RER) soda production, so...	Input	Others/Copied from ...	0.00083 kg	0.606	0.00131	0.0326	0.34600000...	0.01419999...	1.00011
Heat, district or industrial, other than natura...	Input	Others/Copied from ...	1.30000 MJ	0.606	0.00131	0.0326	0.34600000...	0.01419999...	1.00011
Ethane, 1,1,2,2-tetrafluoro-, HFC-134	Output	Emission to air/high ...	5.13000E-6 kg	0.606	0.00131	0.0326	0.34600000...	0.01419999...	1.00011
Disinfectant, at plant (RER) U - RER	Input	Chemicals/Others	0.00040 kg	0.606	0.00131	0.0326	0.34600000...	0.01419999...	1.00011
Yeast, at plant - RER	Input	material/Others	8.59000E-5 kg	0.606	0.00131	0.0326	0.34600000...	0.01419999...	1.00011
Municipal solid waste treatment of, inciner...	Output	Others/Copied from ...	0.00938 kg	0.606	0.00131	0.0326	0.34600000...	0.01419999...	1.00011
Building, hall construction   Cut-off, copied...	Input	Others/Copied from ...	5.12000E-6 m2	0.606	0.00131	0.0326	0.34600000...	0.01419999...	1.00011
Occupation, industrial area, built up	Input	Resource/land	0.00022 m2*a	0.606	0.00131	0.0326	0.34600000...	0.01419999...	1.00011
[Dummy] CIP Central, at plant - RER	Input	Others/Dummies	8.00000E-6 Item(s)	0.606	0.00131	0.0326	0.34600000...	0.01419999...	1.00011
Phosphorus, total	Output	Emission to water/riv...	0.00024 kg	0.606	0.00131	0.0326	0.34600000...	0.01419999...	1.00011
Water, desalinated, produced from sea, distill...	Input	Others/Copied from ...	0.00000 kg	0.606	0.00131	0.0326	0.34600000...	0.01419999...	1.00011

- The product names were only slightly aligned, but it was not aim to provide a full coherent nomenclature

## 2 Results comparison against SimaPro

Always when migrating a database from one reference system like SimaPro to another one, it remains a task and challenge to fully reflect the same results.

This was nicely achieved; however, some comments are useful since results are not entirely identical, for example when using the adapted (i.e., mapped to each respective reference

system) Environmental Footprint method 3.1, in both tools (as integrated in openLCA method package 2.4 and in SimaPro in version 1.00).

For example, comparing the product system for ‘Broiler, broiler feed, conv prod, at farm gate’ in France, process UUID 148b2164-c54e-31df-aa80-3964fdd1006a, with the respective SimaPro calculation results for ‘Broiler, broiler feed, conv prod, at farm gate {FR} U’, yields these results:

openLCA				Broiler, broiler feed, conv prod, at farm gate {FR} U				SP	
Name	Category	Impact as	Unit		Impact category	Unit	Total		
Broiler, broiler feed, conv prod, at farm gate	1t				1kg				
Acidification	EF 3.1 Me	8.525713	mol H+ eq	1.018793	Acidification	mol H+ eq	0.008368446		
Climate change	EF 3.1 Me	1023.364	kg CO2 eq	0.983937	Climate change	kg CO2 eq	1.040070417		
Climate change (biogenic)	EF 3.1 Me	0.557477	kg CO2 eq		1 Climate change - Biogenic	kg CO2 eq	0.000557477		
Climate change (fossil)	EF 3.1 Me	494.8263	kg CO2 eq	0.96579	Climate change - Fossil	kg CO2 eq	0.512353818		
Climate change (land use)	EF 3.1 Me	514.1112	kg CO2 eq	0.975249	Climate change - Land use and LU change	kg CO2 eq	0.527159122		
Ecotoxicity freshwater	EF 3.1 Me	41668.43	CTUe		Ecotoxicity, freshwater - inorganics	CTUe	4.277284444		
Ecotoxicity freshwater (inorganics)	EF 3.1 Me	3834.234	CTUe		Ecotoxicity, freshwater - organics - p.1	CTUe	21.03437797		
Ecotoxicity freshwater (organics)	EF 3.1 Me	37834.19	CTUe		Ecotoxicity, freshwater - organics - p.2	CTUe	6.815274955		
					Ecotoxicity, freshwater - part 1	CTUe	22.80395044		
					Ecotoxicity, freshwater - part 2	CTUe	9.322986924		
Eutrophication freshwater	EF 3.1 Me	0.297426	kg P eq	0.998796	Eutrophication, freshwater	kg P eq	0.000297785		
Eutrophication marine	EF 3.1 Me	5.918254	kg N eq	0.998519	Eutrophication, marine	kg N eq	0.0005927029		
Eutrophication terrestrial	EF 3.1 Me	34.42329	mol N eq	1.005769	Eutrophication, terrestrial	mol N eq	0.034225849		
Human toxicity cancer	EF 3.1 Me	6.36E-07	CTUh	0.537528	Human toxicity, cancer	CTUh	1.18E-09		
Human toxicity cancer (inorganics)	EF 3.1 Me	5.11E-08	CTUh	0.086152	Human toxicity, cancer - inorganics	CTUh	5.93E-10		
Human toxicity cancer (organics)	EF 3.1 Me	5.85E-07	CTUh	0.991259	Human toxicity, cancer - organics	CTUh	5.90E-10		
Human toxicity non-cancer	EF 3.1 Me	1.25E-05	CTUh	0.649527	Human toxicity, non-cancer	CTUh	1.93E-08		
Human toxicity non-cancer (inorganics)	EF 3.1 Me	7.90E-06	CTUh	0.5289	Human toxicity, non-cancer - inorganics	CTUh	1.49E-08		
Human toxicity non-cancer (organics)	EF 3.1 Me	4.62E-06	CTUh	1.064176	Human toxicity, non-cancer - organics	CTUh	4.34E-09		
Ionising radiation (human health)	EF 3.1 Me	61.52744	kBq U235 eq	0.998945	Ionising radiation	kBq U-235 eq	0.061592416		
Land use	EF 3.1 Me	80111.8	dimensionless	1.134115	Land use	Pt	70.63818607		
Ozone depletion	EF 3.1 Me	4.64E-05	kg CFC11 eq	0.99981	Ozone depletion	kg CFC11 eq	4.64E-08		
Particulate matter	EF 3.1 Me	5.89E-05	disease incidence	0.993085	Particulate matter	disease incidence	5.93E-08		
Photochemical ozone formation (human health)	EF 3.1 Me	2.958235	kg NMVOC eq	0.996083	Photochemical ozone formation	kg NMVOC eq	0.002969869		
Resource use fossils	EF 3.1 Me	4998.844	MJ (net calorific value)	1.015974	Resource use, fossils	MJ	4.920247026		
Resource use minerals and metals	EF 3.1 Me	0.003864	kg Sb eq	1.020814	Resource use, minerals and metals	kg Sb eq	3.79E-06		
Water use	EF 3.1 Me	1493.912	m3 world eq	1.051328	Water use	m3 deprived	1.420976029		

- Methane to air, without specification whether fossil or biogenic, is not considered as fossil in openLCA, but in SimaPro -> higher impacts in fossil climate change in SimaPro
- Human toxicity cancer, especially inorganics: In SimaPro, “chromium, ion” is assumed to be Chromium VI which is a very strong assumption, as the common and not cancerous form would be Chromium III -> this is different in openLCA, leading to much higher results in SimaPro, for several inorganic toxicity categories

Compartment:

Indicator:

Cut-off:

Per sub-compartment

Skip unused

Category:

Default units

Exclude long-term emissions

Standard

Group

Per impact category

No	Substance	Compartment	Subcompartment	Unit	Total	
	Total of all compartments				CTUh	1.18E-9
1	Furan	Air	low. pop.	CTUh	4.1E-10	
2	Chromium, ion	Water	river	CTUh	2.85E-10	
3	Formaldehyde	Air	low. pop.	CTUh	1.09E-10	
4	Chromium, ion	Water	groundwater	CTUh	8.4E-11	
5	Chromium, ion	Soil	agricultural	CTUh	5.57E-11	
6	Chromium (VI)	Water	river	CTUh	5E-11	
7	Chromium (III)	Water	river	CTUh	3.2E-11	

- In Land use, transformation to arable land, unspecified use is not considered in SimaPro, but in openLCA (since the EF method provides factors for land transformation “to arable”). This leads to slightly higher results for openLCA.

- Water from rain is not considered in the SimaPro method but in openLCA, leading to slightly higher results for openLCA.

### **3 Distribution of the database**

While earlier versions of the database were entirely free e.g. for educational uses in France, this is now not possible any more, a problem seem the integrated ecoinvent datasets, as we learned from ADEME. We regret this (and see of course no relation to the announced “partnership” between ecoinvent and ADEME / Agribalyse) but of course follow.

Since openLCA is able to calculate also incomplete supply chains, different from SimaPro, we are planning to make a “pure” Agribalyse without ecoinvent, and release this again for free, but this needs to be agreed with ADEME of course.

The current database is thus available for Nexus, as an update of the already existing Agribalyse 3.1. For download, an ecoinvent license is required.

### **4 Contact and Feedback**

Feedback is welcome!

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