LCA Food 2018 and LCA AgriFood Asia 2018: *(1-A) LCA Methods; (1-B) From Farm to Table;*

AGRIBALYSE®: strengths and challenges of a national LCI database initiative

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Abstract

Agriculture and food LCI databases have developed rapidly in recent years. In this context, this article provides an update on the French AGRIBALYSE database and program, which has been running for almost 10 years. The authors have been the key contributors in this original initiative and share their learnings and views on the challenges ahead, both on the development of datasets but also on the promotion of Life Cycle Thinking in the French food sector. These highlights should be useful for all database developers, for users interested in good quality and harmonized data, and more broadly for promoters of eco-design and a more sustainable food sector.

Keywords: *LCI database, ecodesign, national project, France, partnership, participative approach*

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Introduction

In 2007, France launched a major environment round table called "Grenelle de l'Environnement" to promote more sustainable production and consumption. One outcome was the decision to use LCA as the reference framework for assessing the environmental performance of food products. The government also wanted to promote the development of a generalized environmental labelling scheme. The need for a consistent Life Cycle inventory (LCI) database for agricultural products that reflects the national specificities was highlighted. Consequently, between 2010 and 2013 consistent methodological guidelines were developed and the AGRIBALYSE database was built, under the coordination of the French environmental Agency (ADEME) and based on the expertise of a network of scientific research institutes (INRA and Agroscope), applied research institutes and experts. Following the publication of the database in 2013, the program was extended until the end of 2018 ("AGRIBALYSE 2") (ADEME 2017).

Material and methods

The discussion is based on the results of ongoing and recently completed AGRIBALYSE 2 projects. The strengths and challenges analysis is based on the partners' contribution in the projects, the discussions in the technical and steering committees, and the coordination work of ADEME.

Results and Discussion

The AGRIBALYSE v1.3 database contains more than 250 agricultural product LCIs, and more than 500 "supporting LCIs" (e.g.: inputs, field operations etc.). Since version 1.3, the database is directly available in the SimaPro and OpenLCA software. Data are free of charge for anyone with an ecoinvent licence. The partnership and governance evolved from a single database-building project (AGRIBALYSE 1) to several parallel projects (AGRIBALYSE 2; Figure 1). The cooperation and coordination by the technical and steering committees has been key to ensure the consistency of the database on all transversal questions (metadata, emission models etc.). The program continues to enjoy strong public support, 50% of the costs being supplied mainly by ADEME, but also by other public agencies more interested in specific topics (Water Agency, Ministries etc.), the rest being at project participants' expenses. The next database update is expected by the end of 2019, with major changes as it will update most agricultural data and expand its scope from the farm gate to the retailer gate. This expansion aims to connect the AGRIBALYSE database with the official French CIQUAL nutrition database (ANSES 2018).

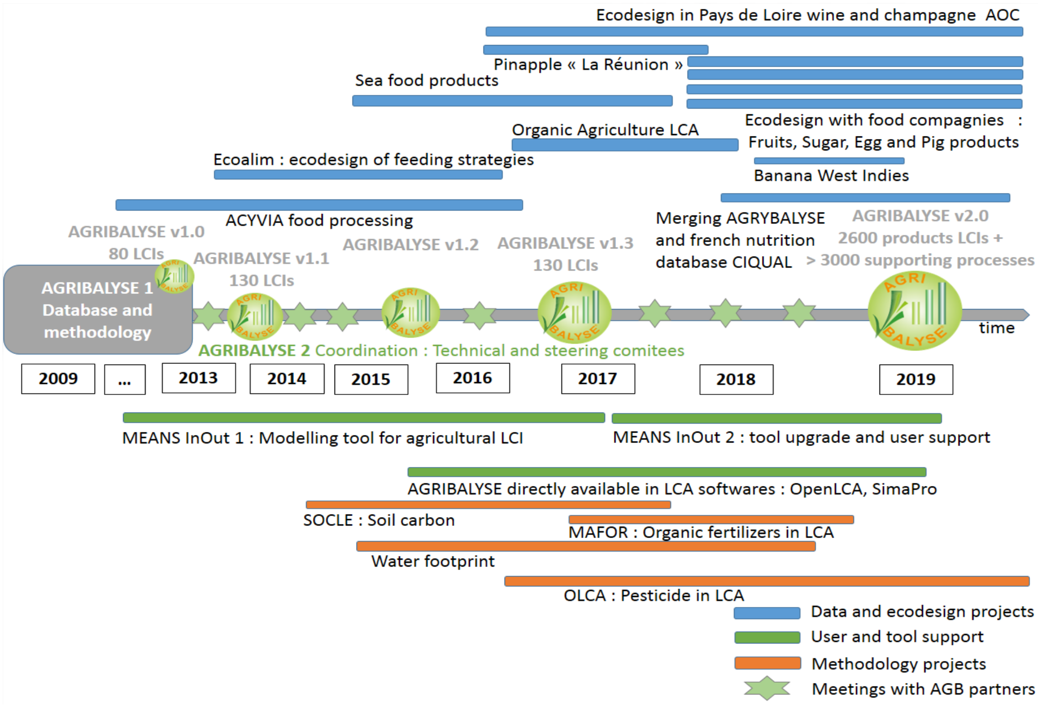

Figure 1. AGRIBALYSE 2 projects: building and sharing knowledge and data (ADEME 2017)

AGRIBALYSE 2 had set several priorities when it started (Table 1). We will discuss to what extent the expectations were met and the challenges were faced.

Table 1. Level of achievements for AGRIBALYSE 2. ☺ Aim mostly achieved, ☺ 😐 Aim partly achieved ; 😐 Some progress but aim not really achieved *This objective was not identified initially; it appeared as a necessity during recent years. This point is connected to the methodology target.

Objectives	**« Success »**
Provide LCI benchmarks for missing agricultural and sea food products.	☺
Change scale: from current average practices to "best agronomic practices". Expanding from farm gate to retail gate.	☺
Facilitate reproducibility of calculations.	☺ 😐
Work on methodological improvements (soil carbon, water use, pesticide use etc.).	😐
Disseminate results and life cycle thinking	😐
Contribute to international harmonization*	☺ 😐

AGRIBALYSE provides good quality LCI data for France. In phase 2, several projects have produced more data for national key products: animal feeds, fruits and vegetables, wine, seafood products (with methodological challenge as well), etc. Those projects did not only focus on average systems, but also built benchmarks for eco-designed systems (Colomb et al. 2018). Changing scale has raised several challenges, inducing the need for more parameters and more inputs, to properly reflect the improvement potential of some agronomic practices (organic production, mixed cropping, nitrate-fixing intermediate crops) and technical leverages and new inputs (e.g. auxiliary insects for integrated pest management). Data access and representativeness remains a challenge for those projects, as well as fitting the "LCA approach" with an "Agronomic approach", built at the farm level rather than the product level. Finally, complementary data for downstream processes (ex: ACYVIA for food processing) were also produced, and combined with international databases should enable to expand the scope to the retailer gate as expected. So far, solutions have always been found for those projects and the data are being progressively integrated in the AGRIBALYSE database.

Efficient IT tools increasingly become a key for the reproducibility of calculations and for database management as the datasets enlarge. INRA, ADEME and more recently CIRAD joined efforts to support the development of a web-based "MEANS-InOut software", facilitating the modelling of field direct emissions and the production of LCIs following the AGRIBALYSE method (Auberger et al. 2018). All new data for AGRIBALYSE are produced using the Means-Inout web application, except for the sea-food (relevance of an IT development is under discussion). MEANS-InOut, launched in 2016, it is a major step in AGRIBALYSE program. A detailed user-survey will be conducted soon, however it seems that MEANS-InOut is a powerful tool, adapted in particular for average systems, but its use is more complex for innovative systems and when many new inputs are required. Also, it remains an tool more for LCA experts, its use by typical technicians or corporate social responsibility managers remains difficult. Finally, we noticed that similar tools are under development for other databases. Each one represents a massive investment, and stronger collaboration could be relevant there.

AGRIBALYSE uses emission models validated for France, looking for Tier 2 or Tier 3 models for hotspot emissions. Several improvements were expected for AGRIBALYSE 2 on water footprint, pesticides, soil carbon and pollutant emissions associated with organic fertilizers in particular. Significant steps forward have been made on each topic, improving our understanding and offering some solutions. Solutions are now operational for water footprint, should be available soon for organic fertilizers and pesticides, whereas more work is still required on soil carbon dynamics. Assessment of impact on biodiversity is explored in several projects, but no operational solution seems ready to be implemented in the short term. In several projects, proposed methodological solutions were implemented on limited datasets only, and could not be applied to the database as a whole. Apparently, it is very difficult to combine methodology developments and broad updates in one project. Consequently, AGRIBALYSE program now needs to find efficient ways to apply these methods to the whole database. Probably Means-Inout will here again be one of the keys. More broadly, our data for France are more accurate than those published in international/generic databases. The drawback is that there is no general harmonization in the modelling approach among international/generic databases and attention is needed when combining LCI data. Database harmonization is a tricky topic for national initiatives. Indeed, our priority has been to insure internal consistency for the database. However, this is not sufficient, because in a global market, food industry needs to combine our data with other sources. We should make sure that harmonization does not result in lower data quality and we advocate a tier approach (Colomb et al 2016). Harmonization groups do exists (LEAP, PEF, etc.) but they are not focused on existing database and database developers, resulting in the creation of a new standard each time, rather than contributing to operational convergence of the main databases (ecoinvent, WorldFoodDatabase, Agrifootprint, Thinkstep, etc.). A consensus platform specifically targeting food database developers would probably be useful to promote harmonization.

Finally, just as important as the data, the program further connects a strong network of researchers, agricultural professionals and LCA consultants, bringing capacity building and fueling new initiatives within and outside AGRIBALYSE. Many AGRIBALYSE projects involve agricultural professionals in a participative approach, which has proven essential for data quality and acceptability in the agri-food sector in France. The database and related methodology are now used for most agricultural and food LCA projects in France. A significant number of European and international teams also use the data because they are public and can fill data gaps in countries lacking benchmarks. AGRIBALYSE data have also been used in most European Union food Product Environmental Footprint (PEF) studies and will be used with a minor modification as French benchmark in the PEF database. A national database program needs an in-house maintenance and distribution strategy with direct discussion with LCI databases and LCA software developers. Stronger connection to global networks such as the Global LCA Data Access (GLAD) network could bring some solutions. We believe that the program is now rather well identified in the LCA community. However many projects interested in food sustainability do not yet take into account life cycle thinking. In the agri-food business LCA is not yet sufficiently known and is still perceived as complex; especially for small and medium companies. Databases have enriched and improved significantly, but methodological challenges for agriculture remain, and complementary indicators/approach are necessary in operational projects. More communication outside the LCA community, more capacity building and operational pilot projects are required, to further prove the relevance and efficiency of the Life Cycle Approach in the agriculture and food sector.

Conclusion

Since 2013 the AGRIBALYSE program has provided useful results for many target groups: agribusiness, research and education, policy, consultants within and outside France. However, demand for AGRIBALYSE LCI data remains below its potential. There is a challenge to further disseminate the LCA approach in mainstream policy, research and corporate social responsibility strategies for a more sustainable food system.

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