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Calculation of the environmental labeling of food products based on the packaging information

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This paper outlines the main aspects of a more detailed article recently published (Coste and Hélias 2022). The environmental footprint of products is a story of trade-offs: the assessment has to be accurate, adapted to the production and processing choices in the value chain. Unfortunately, this need for specific data quickly becomes an obstacle and makes the work too complex and too expensive to be done on a large scale. In contrast, generic data offers a quick and cheap result, but these default values only allow comparisons between product categories and differentiation of products within the same category is impossible.

For food products in France, the Agribalyse (ADEME, 2020) database provides 2,500 'generic' food products. The main factors determining the environmental impact of a food product are the ingredients, which are often more important for the overall result than the transport or processing. The agricultural stage therefore requires particular attention. Production methods are thus a determining factor, but the quantity of each ingredient is also obviously a specificity that must be integrated into the calculations. Generic recipes, as is the case in Agribalyse, are an average recipe and when we are interested in a specific market product, this can often prove to be unrepresentative. We have developed the PEFAP calculator (Product Environmental Footprint According to Packaging data) which automatically estimates environmental impacts based on the information available on the packaging.

Based on the partial list of ingredients (an ordered list, but with often unknown proportions) and nutritional data available on packaging, the algorithm explores the range of possible recipes through a Monte Carlo approach. In each iteration, the masses of ingredients are randomly chosen according to the possible proportions of ingredients and ensuring the best possible preservation of nutrient contents (the nutrients of the product being considered as the sum of the nutrients of all its ingredients). PEFAP retrieves, for each ingredient, the environmental impacts from Agribalyse and the nutrient data from Ciquel database (ANSES 2020), the French national nutritional database for food ingredients. It finds the most likely footprint by the convergence of the result over Monte Carlo runs. From a barcode, the user obtains in a few seconds a specific footprint of the product : data tables and summary web page of the evaluation, see Figure 1 for an illustration. This allows intra-category comparisons and provides more accurate footprints than the generic values from Agribalyse.

Particular attention has been devoted to the correspondence between the databases. The OpenFoodFact (2012) database enables the automatic association of packaging information with a barcode. The ingredients identified in Agribalyse (which are the same as in Ciquel) were matched to this nomenclature of ingredients. When the environmental (from Agribalyse) and/or nutritional (from

Ciqual) information is not available, the average value of the " children " or " parents " ingredients in the OpenFoodFact nomenclature are used.

Footprints have already been calculated for the 150'000 reasonably reliable products of the Open Food Facts database. This includes a subset of 30,000 products with data that are considered fully reliable. This makes it possible to see the variability of impacts within the same product category and the variability of impacts induced by the recipes. The creation of this algorithm makes it possible to better specify the characteristics of food products and makes environmental footprints and labeling more reliable.

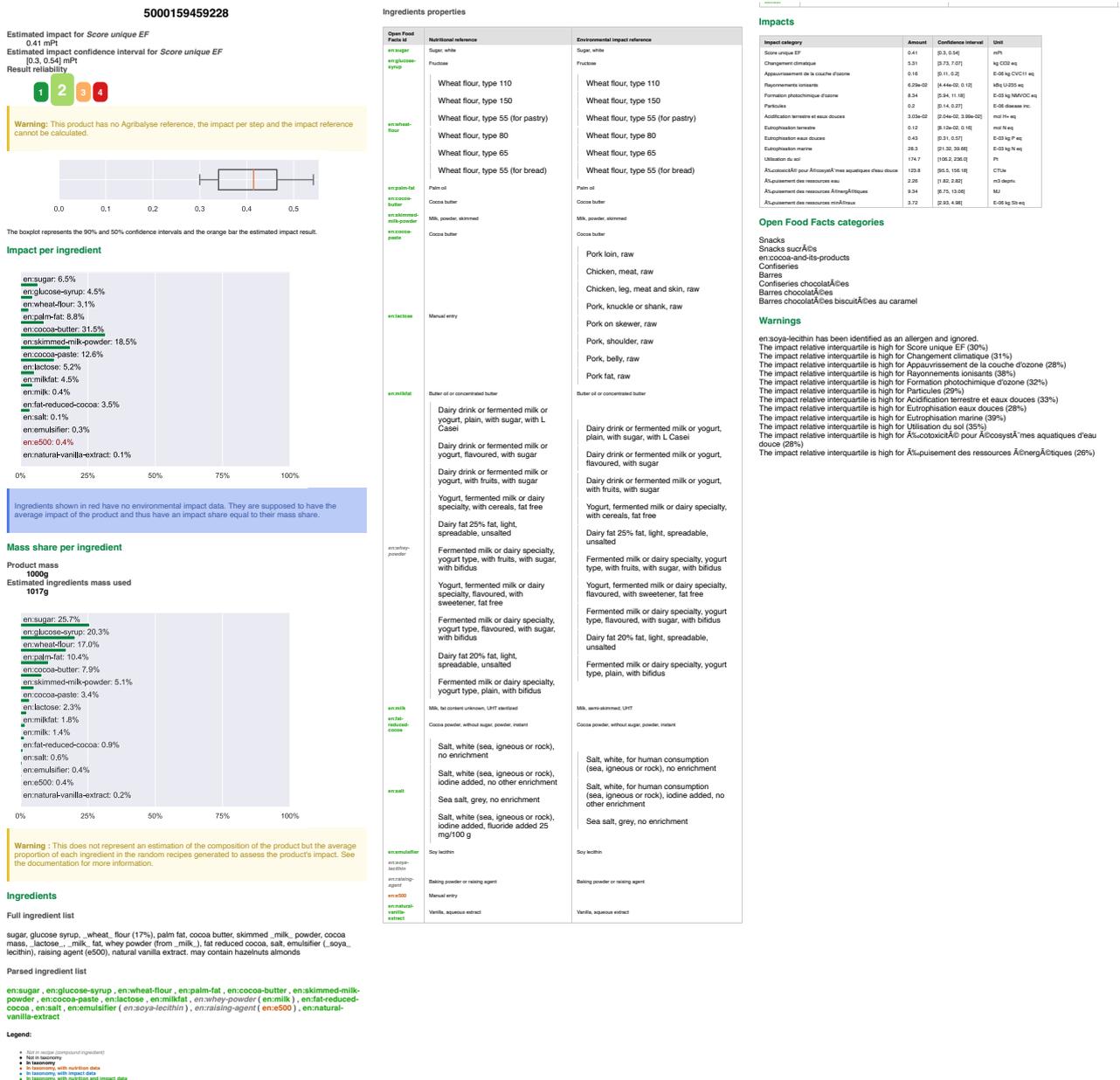


Figure 1. Example of an impact sheet generated automatically for a given food product

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