Gino Baudry*, Agathe Crosnier*, Laurence Jeangros**, Marie-Clémence Breuillot*
gino.baudry@epfl.ch; agathe.crosnier@epfl.ch; laurence.jeangros@unil.ch; marie-clemence.breuillot@epfl.ch;
Research
EPFL, LEUrE - Laboratory of Environmental and Urban Economics
University of Lausanne (UNIL), HEC Lausanne

Agroecology Scientific Day 2024

Workshop n°6, Session n°3

Title: A bite from true cost accounting for food: the case of bread & wine

Abstract:

According to the FAO, the hidden costs of the food and agriculture system - *i.e. the monetary value of the hidden impacts of food related activities on the environment, society and health* - are estimated at between 12 and 17 trillion USD_{2020} per year [1]. This represents at least twice the total expenditure on food. In high-income countries, these hidden costs are mainly due to unhealthy, unsustainable and resource-intensive diets, as well as food waste by consumers. In Switzerland, the hidden costs are estimated at between 12 and 27 billion USD_{2020}, with around 84% for health (mainly diet-related diseases) and 16% for the environment (mainly greenhouse gases) [2]. A few months ago, the FAO even issued a call to action to governments, urging them to invest in research, data collection and capacity building to "*use true cost accounting to systematically take into account hidden costs and benefits in order to guide structural changes towards agri-food systems that provide affordable, healthy and sustainable diets*". However, there is no standardised methodology and product-based studies are still rare.

We want to help fill this gap by assessing the impact of universally consumed foodstuff that have permeated food cultures for millennia: bread and wine, using a true cost accounting method [3], [4], [5]. The scope of the studied system follows a farm-to-fork analysis, which includes primary production, manufacturing, retail, consumption and waste. A typical Swiss bread and wine recipes were used to define the list, weight and origin of ingredients. For bread, two types of flour (wholegrain and refined) were assessed, adapting the recipe accordingly. Three farming systems were considered for primary production. Conventional farming, extensive farming and organic farming, which account for 64%, 29% and 7% respectively of Swiss wheat production [6]. Finally, the true cost of bread has been assessed through both a consumption and production-based approach to consider the impact of food wastes, which is about 55% for bread in Switzerland [7]. A similar approach was used for wine, but considering the non-food value chain downstream, unlike bread. The integrated production system, prevalent in about 85% of the vineyard area [8], has been modelled on cooperative wineries with a circular economy perspective and focused on white wine production, for which the local consumption is particularly attractive in Switzerland [9].

For bread, the overall results confirms findings from other studies, by highlighting the predominant and determinant role of health in the true cost of wholegrain versus refined bread. This is mainly due to a reference diet low in fibre, which is associated with the burden of coronary heart disease (CHD), colorectal cancer (CRC) and type 2 diabetes (T2D). Due to an insufficient consumption of wholegrain cereals, the consumption of wholegrain bread would reduce the number of DALYs and would therefore bring benefits, i.e. a negative cost. Secondly, the impacts on biodiversity clearly divide agricultural practices, from organic to intensive farming. As a result, the true cost of wholegrain bread per kg of product is estimated at -CHF 12.24, -CHF 11.80 and -CHF 11.39 for organic, extensive and intensive farming. The true costs of refined bread are estimated at CHF 2.12, CHF 2.73 and CHF 3.27 respectively, with impacts on biodiversity accounting for the highest proportion of costs (53%, 66% and 71% respectively). Farming practices is the second most discriminating factor, with conventional farming performing better than extensive and organic practices per kg of product (reverse order per area). This is explained by the higher yield per hectare performed in conventional agriculture, and thus the smaller plot necessary to produce the same amount of wheat. For wine, the true costs were estimated at CHF 7.78 per litre, excluding diet-related impacts. These costs are primarily attributable to biodiversity impacts associated with cultivation (77%) and environmental concerns (10%), with 60% of the environmental costs derived from grape production and 40% from the winemaking process.

Bibliographic references

[1] FAO, 'The state of food and agriculture 2023 - revealing the true cost of food to transform agrifood systems', Food and Agriculture Organization of the United Nations, Rome, 2023. [Online]. Available: https://doi.org/10.4060/cc7724en
[2] A. Muller and K. De Luca, 'Hidden costs and benefits of the Swiss Agrifood System, Case study for the State of Food and Agriculture Report SOFA 2024', FiBL, 2024.
[3] Rockfeller foundation, 'True Cost of Food Measuring What Matters to Transform the U.S. Food System', Rockfeller foundation, 2021. [Online]. Available: https://www.rockefellerfoundation.org/report/true-cost-of-food-measuring-what-matters-to-transform-the-u-s-food-system/
[4] True Cost Initiative, 'TCA Handbook – Practical True Cost Accounting guidelines for the food and farming sector on impact measurement, valuation and reporting.', 2022. [Online]. Available: http://tca2f.org/wp-content/uploads/2022/03/TCA_Agrifood_Handbook.pdf
[5] A. Michalke, S. Köhler, L. Messmann, A. Thorenz, A. Tuma, and T. Gaugler, 'True cost accounting of organic and conventional food production', *Journal of Cleaner Production*, vol. 408, p. 137134, Jul. 2023, doi: 10.1016/j.jclepro.2023.137134.
[6] Swiss Federal Statistics Office, 'Stat-Tab'. 2024. [Online]. Available: https://www.pxweb.bfs.admin.ch/pxweb/en/
[7] C. Beretta and S. Hellweg, 'Lebensmittelverluste in der Schweiz: Mengen und Umweltbelastung. Wissenschaftli-cher Schlussbericht', ETH Zürich, 2019.
[8] Pfister, Richard, et al. 'Viticulture: Quelle protection contre les parasites et quel entretien du sol? ', Revue suisse de viticulture, arboriculture et horticulture, vol. 51, no. 4, p. 226-232, 2019.)
[9] Office fédéral de l'Agriculture (OFAG), 'L'année viticole 2023 - Statistiques vitivinicoles', 2024.

[10] Arora, Monika, and al, 'The impact of alcohol consumption on cardiovascular health: myths and measures', Global Heart 17.1, 2022.