

Environmental impact generation in the cradle-to-farm gate link: analysis of the importance of the on-farm versus off-farm stage

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Most LCAs carried out in the agricultural field focus on the entire cradle-to-farm gate link of the agri-food chain, without specifically distinguishing between on- and off-farm environmental impacts. Although this allows for a comprehensive assessment of the overall environmental impacts, a precise knowledge on their distribution between the on-farm and off-farm (upstream) stages is necessary to better understand the role of these two stages in the agricultural environmental impact generation. The aim of our work is to determine for Swiss dairy farming in the alpine area the relative importance of these two stages in the overall environmental impact.

Our work relies on the dataset made of a pooled sample of 56 Swiss dairy farms of the alpine area (see Table 1), described in detail in Jan et al. (2012). For each farm, the environmental impacts generated from the cradle to the farm gate have been estimated using the SALCA (Swiss Agricultural Life Cycle Assessment) approach. We decomposed these impacts into their off-farm (upstream) and on-farm parts. In a subsequent step, the proportion of impacts generated on- versus off-farm is analysed specifically for each environmental impact category.

The average and median share of the impacts generated on- versus off-farm, as well as the variability of the on-farm proportion, vary according to the impact category considered (Fig. 1). More than half of the overall average impact generation in the cradle-to-farm gate link takes place on-farm for the environmental impact categories terrestrial eutrophication, acidification, ozone formation, land competition, global warming potential, eutrophication aquatic P and eutrophication aquatic N. For the impact categories water deprivation, aquatic ecotoxicity, terrestrial ecotoxicity and human toxicity, the off-farm share predominates on average and varies between 50% and 80% depending on the impact category considered.

Our work shows that the importance of the on- versus off-farm stage varies according to the environmental impact category considered. In that sense, it highlights for each category where (i.e. off-/on-farm) the focus should be primarily placed if we wish to reduce the environmental impact generation. This information will be especially precious when analysing the compliance of a farm with the carrying capacity of its local ecosystem.

Reference

JAN, P., DUX, D., LIPS, M., ALIG, M. & DUMONDEL, M., 2012. On the link between economic and environmental performance of Swiss dairy farms of the alpine area. *The International Journal of Life Cycle Assessment*, 17, 706-719.

Table 1: Range and mean value of farm characteristics of the 56 sample farms, based on farm accountancy data

Farm intensity and scale	Minimum	Maximum	Average
Farm livestock units (LU)	9.81	50.50	24.97
Total milk production in kg	30'265	243'587	111'624
Milk yield per cow in kg	2'858	12'167	6'027
Farm usable agricultural area (UAA) in ha	7.98	40.60	22.49
Stocking rate (LU/UAA)	0.45	2.00	1.18

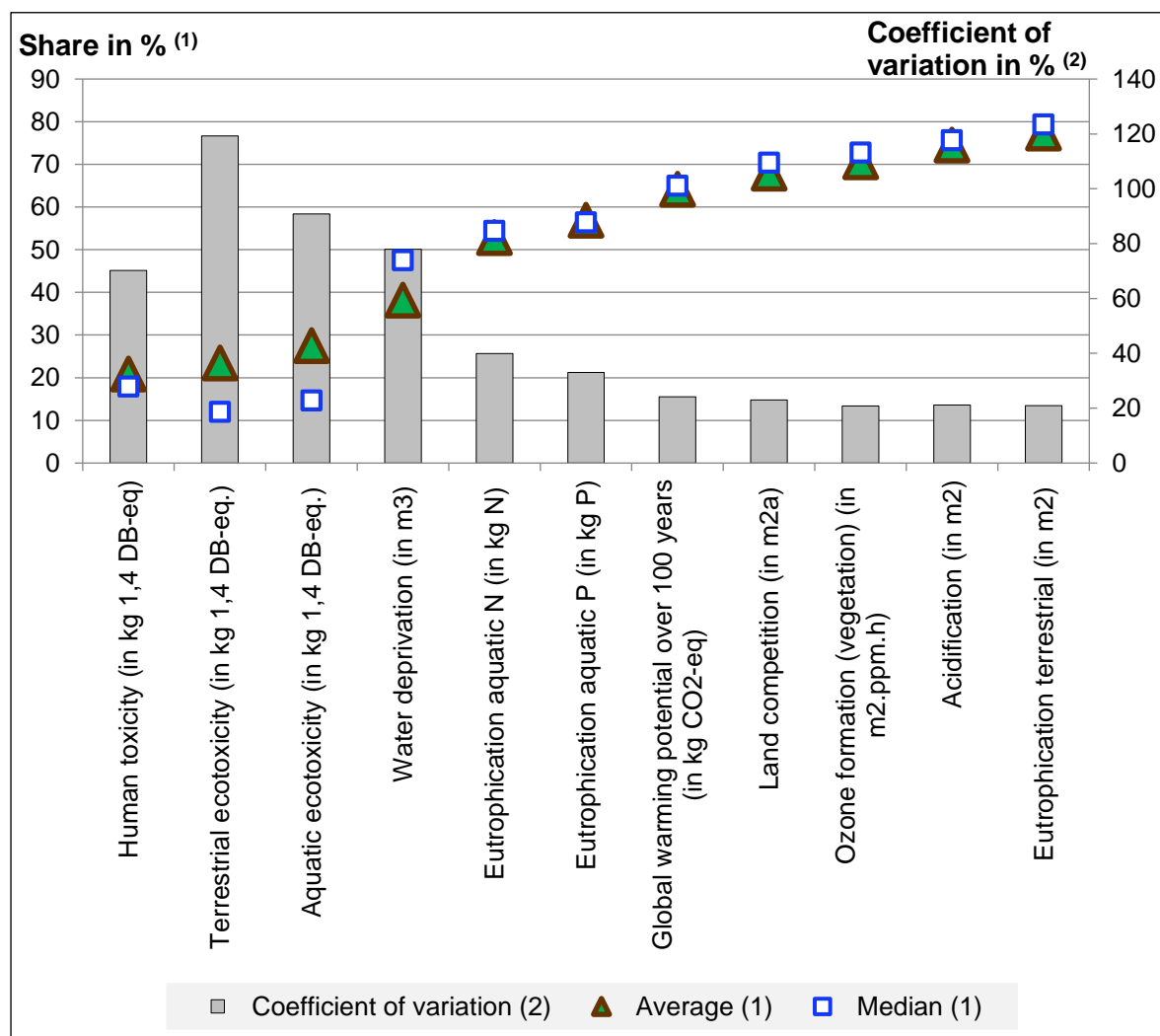


Figure 1: On-farm impact share for different impact categories listed from left to right in ascending order of average on-farm share