

Book of Abstracts

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'Soil Science in a Changing World'

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THE ROLE OF SOIL VARIATION IN NUTRIENT BALANCE MODELLING ON DAIRY FARMS

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The Annual Nutrient Cycle Assessment (ANCA, in Dutch: 'Kringloopwijzer') calculates nitrogen (N) and phosphorus (P) balances for Dutch dairy farms, to estimate N and P losses to the environment. Gaseous emissions (N), leaching, run-off and accumulation or depletion of soil N and P stocks are calculated. All calculations are performed at farm level and not at field level, as ANCA uses averaged nutrient inputs and outputs across all fields, and therefore it excludes field-specific soil characteristics. Land management, however, is field-specific and determined by crop and soil characteristics. For an accurate estimate of on-farm nutrient flows, using the appropriate spatial scale of nutrient inputs and outputs is likely imperative to account for soil variation. Our aim was therefore to analyse the impact of soil variation in the assessment of nutrient balances at the farm and field level. We selected five dairy farms in the Netherlands that varied in soil types and the degree of within-farm soil variation. A full year of N and P input and output data on farm and field level were provided by the farmers, while soil variation was determined using the Dutch 1:50.000 soil map. N and P balances were calculated at farm level using ANCA, and calculated at field level using field-specific input and output data provided by the farmers. Nutrient balances at the field level were aggregated to the farm level and compared to ANCA at farm level, focussing on N emissions, leaching and nutrient use efficiency. We discuss the importance of spatial scale in nutrient balance analysis in relation to within-farm soil variation. This study highlights to which extent within-farm soil variation should be taken into account when modelling nutrient flows and nutrient use efficiencies at farm level, to contribute to field-based decision making for improved land management and sustainable food production.