**DairyPrint model: Paving pathways for dairy farmers towards higher sustainability.**

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Quantifying greenhouse gas (GHG) emissions (i.e., methane, nitrous oxide, and carbon dioxide) from all significant sources in dairy farms is difficult and prohibitively expensive. The same applies to nutrient balance and management. Therefore, farmers must rely on mathematical models to achieve this. Available models are cumbersome and overwhelming to use. Thus, our objective is to develop the DairyPrint Model: a simple, minimalistic, user-friendly, and scientifically sound whole-farm decision support model to assess environmental tradeoffs of dairy farming. The DairyPrint Model is composed of herd, manure, crop, and economic modules. In the herd module, based on inputs such as total number of cows, calving interval, and culling rate the model runs the simulations performing herd dynamics in monthly steps, outputting annual herd demographics. Moreover, milk yield curves and milk composition, body weight, dry matter intake, and feed efficiency are estimated. These variables, in turn, are used to estimate the total excreted manure, urine, feces, nitrogen, phosphorus, and potassium, in addition to enteric methane emissions. From the herd module, there is a distribution of the produced outputs into other modules, in addition to the specific user inputs for each module. The barn module receives all the manure produced and from it, along with information from weather data and type of facility (free-stall or tie-stall), methane, ammonia, and nitrous oxide emissions are estimated. Once the manure in the barn is transferred to the manure module, the manure is handled and processed according to the practices adopted by the farm. After manure processing, the processed material is distributed to the crop fields in the crop module. In the crop module, all GHG emissions are accounted for due to the application of manure, fertilizers, and limestone. Additionally, nutrient balances are estimated. Therefore, the DairyPrint Model is capable of helping farmers move toward higher sustainability, providing a user-friendly and intuitive graphical user interface allowing the user to respond to "what-if" questions.

**KEYWORDS**
greenhouse gas
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