breed4green: First results from a dataset on methane emissions in commercial farms for genetic studies

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In the project breed4green, the genetic potential for reducing methane emissions and enhancing feed efficiency is investigated in Fleckvieh and Brown Swiss cattle.

Given the limited population size of these breeds, indirect traits are of special interest. Additional to the use of data from research stations, a comprehensive data recording concept was developed to measure methane emissions on commercial farms. Data from precision livestock farming systems, like daily milk yield, animal-based sensor data or feeding data are collected. The GreenFeed system and scales are moved between farms for measuring methane and body weight over two 6-week periods on each farm. Weekly milk recordings form the basis for mid-infrared predicted proxies for methane. Body condition, lameness, blood ketone tests, animal health records, hoof trimming data and detailed information on the rations fed are recorded throughout the study. Data recording on 30 farms will continue until 2027. Currently, analyses are available for 681 animals from 16 farms. Cows had a mean body weight of 717 kg and a daily milk yield of 30.8 kg. The mean methane emission measured in 76,982 GreenFeed visits was 431 g per cow per day. To encourage farmer participation, continuous feedback is provided, including reports on methane emissions, feed efficiency, body condition score, lameness score, and benchmarking analyses. The comprehensive dataset is used to investigate genetic relationships between feed efficiency, methane and carbon dioxide emissions, and additional selection traits. Indirect traits to predict methane production, energy balance, and feed intake suitable for integration in breeding programs are developed and validated, focusing on the potential of MIR-based estimators to reduce methane emissions and improve feed efficiency. The study shows that recording methane emissions using the GreenFeed system is feasible on commercial farms. Preliminary genetic analyses for methane emissions in Fleckvieh cattle, including variability between cows, trait correlations and heritability estimates, show promising results. Initial genetic analyses of the indirect traits estimated feed intake and residual carbon dioxide in Fleckvieh cattle suggest that the heritability is moderate. They also show promising correlations with actual and residual feed intake.