Genetic selection for lower predicted methane emissions in dairy cattle

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Mitigation of ruminant methane (CH_4) emission has become an important area of research because accumulation of CH_4 has been linked to global warming. Little information is yet known on opportunities for mitigation via animal genetics. Measuring CH_4 production directly from animals is difficult and hinders direct selection on reduced CH_4 emissions. However, improvements can be made through selection on traits that are correlated to CH_4 emissions (e.g. RFI) or through selection on CH_4 predicted from feed intake and diet composition (e.g. the International Panel on Climate Change Tier-2). The aim of this study was to estimate phenotypic and genetic associations between residual feed intake (RFI) and predicted CH_4 emission. Data was used from an experimental farm. Genotypes, daily feed intake records, weekly live weights and weekly milk productions were available from 588 heifers. RFI (MJ/d) was calculated as the difference between net energy intake and calculated energy requirements for milk, fat, and protein yields, and maintenance costs as a function of metabolic live weight. Predicted CH_4 emission (gram/day) was calculated with the IPCC-method and is 6% of gross energy intake. Estimated heritability for predicted CH_4 emission was 50%. Both phenotypic and genetic correlation between RFI and predicted CH_4 emission were on average approximately 0.60, showing that it is possible to decrease the predicted CH_4 emission by selecting more efficient cows, with the assumption that diet digestibility does not differ between efficient and non-efficient cows. Depending on lactation stage, the correlation between predicted CH_4 emission and milk production varied between +0.5 and -0.6. In late lactation more food was consumed than required for milk production. Hence, simply increasing yield is not always the answer to reducing CH_4 emission.