Dokumenttyp: Zeitschriftenaufsatz

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Titel des Beitrags:
Methane prediction based on individual or groups of milk fatty acids for dairy cows fed rations with or without linseed

Abstract:
Milk fatty acids (MFA) are a proxy for the prediction of CH4 emission from cows, and prediction differs with diet. Our objectives were (1) to compare the effect of diets on the relation between MFA profile and measured CH4 production, (2) to predict CH4 production based on 6 data sets differing in the number and type of MFA, and (3) to test whether additional inclusion of energy-corrected milk (ECM) yield or dry matter intake (DMI) as explanatory variables improves predictions. Twenty dairy cows were used. Four diets were used based on corn silage (CS) or grass silage (GS) without (L0) or with linseed (LS) supplementation. Ten cows were fed CS-L0 and CS-LS and the other 10 cows were fed GS-L0 and GS-LS in random order. In feeding wk 5 of each diet, CH4 production (L/d) was measured in respiration chambers for 48 h and milk was analyzed for MFA concentrations by gas chromatography. Specific CH4 prediction equations were obtained for L0-, LS-, GS-, and CS-based diets and for all 4 diets collectively and validated by an internal cross-validation. Models were developed containing either 43 identified MFA or a reduced set of
7 groups of biochemically related MFA plus C16:0 and C18:0. The CS and LS diets reduced CH4 production compared with GS and L0 diets, respectively. Methane yield (L/kg of DMI) reduction by LS was higher with CS than GS diets. The concentrations of C18:1 trans and n-3 MFA differed among GS and CS diets. The LS diets resulted in a higher proportion of unsaturated MFA at the expense of saturated MFA. When using the data set of 43 individual MFA to predict CH4 production (L/d), the cross-validation coefficient of determination (R2CV) ranged from 0.47 to 0.92. When using groups of MFA variables, the R2CV ranged from 0.31 to 0.84. The fit parameters of the latter models were improved by inclusion of ECM or DMI, but not when added to the data set of 43 MFA for all diets pooled. Models based on GS diets always had a lower prediction potential (R2CV = 0.31 to 0.71) compared with data from CS diets (R2CV = 0.56 to 0.92). Models based on LS diets produced lower prediction with data sets with reduced MFA variables (R2CV = 0.62 to 0.68) compared with L0 diets (R2CV = 0.67 to 0.80). The MFA C18:1 cis-9 and C24:0 and the monounsaturated FA occurred most often in models. In conclusion, models with a reduced number of MFA variables and ECM or DMI are suitable for CH4 prediction, and CH4 prediction equations based on diets containing linseed resulted in lower prediction accuracy.

Stichworte: BayBioMS; dairy cow; methane emission prediction; methane mitigation; methane proxy; milk fatty acids

Zeitschriftentitel: Journal of Dairy Science

Jahr: 2019

Band: 102

Heft / Issue: 2

Seiten: 1788-1802

Volltext / DOI: http://doi.org/10.3168/jds.2018-14911

Verlag / Institution: American Dairy Science Association

E-ISSN: 0022-0302

Publikationsdatum: 01.02.2019

Occurences: · Einrichtungen > Fakultäten > Fakultät Wissenschaftszentrum Weihenstephan > Zentren > Bayerisches Zentrum für Biomolekulare Massenspektrometrie (Prof. Küster/Prof. Hofmann) > Jahr > 2019

Entries: