Mecklenburg-Vorpommern

Landesforschungsanstalt für Landwirtschaft und Fischerei

Validation of a new estimation equation for nitrogen excretions of dairy cows with on-farm data

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Introduction

- Aim of "**MoMiNE**" project: improvement of estimation of **nitrogen excretions** of dairy cows in Germany
- current equation: Bannink & Hindle, 2003 –> based on milk data from the Netherlands
- new equation: **Honig et al., 2024** –> based on data from research stations in Germany (1,628 cows; project **eMissionCow**, 2018-2021)

N-excretions (g/d) = -235.2 + 4.8 x milk yield (kg/d) + 0.8 x milk urea content (ppm) + 84.1 x milk protein content (%) (for Holstein and Fleckvieh/Simmental)

- equation is made to predict N-excretions of herds on a whole farm context with information from milk recordings only

Validation with on-farm data is needed to check applicability for individual feeding groups and single farm data.

Material + Methods

- 2 dairy farms from Mecklenburg-Western Pomerania (Germany)

  Farm A (~ 320 cows in milk) **Farm B (~480 cows in milk)**

- **Data collection: September 2023 – December 2024**

  - **milk recording data** (1x per month -> Farm **A**: 16 months; Farm **B**: 15 months)

  - information about **number of animals, average milk yield and days in milk (DIM) per feeding group**

  - **rations** and their dates of changing

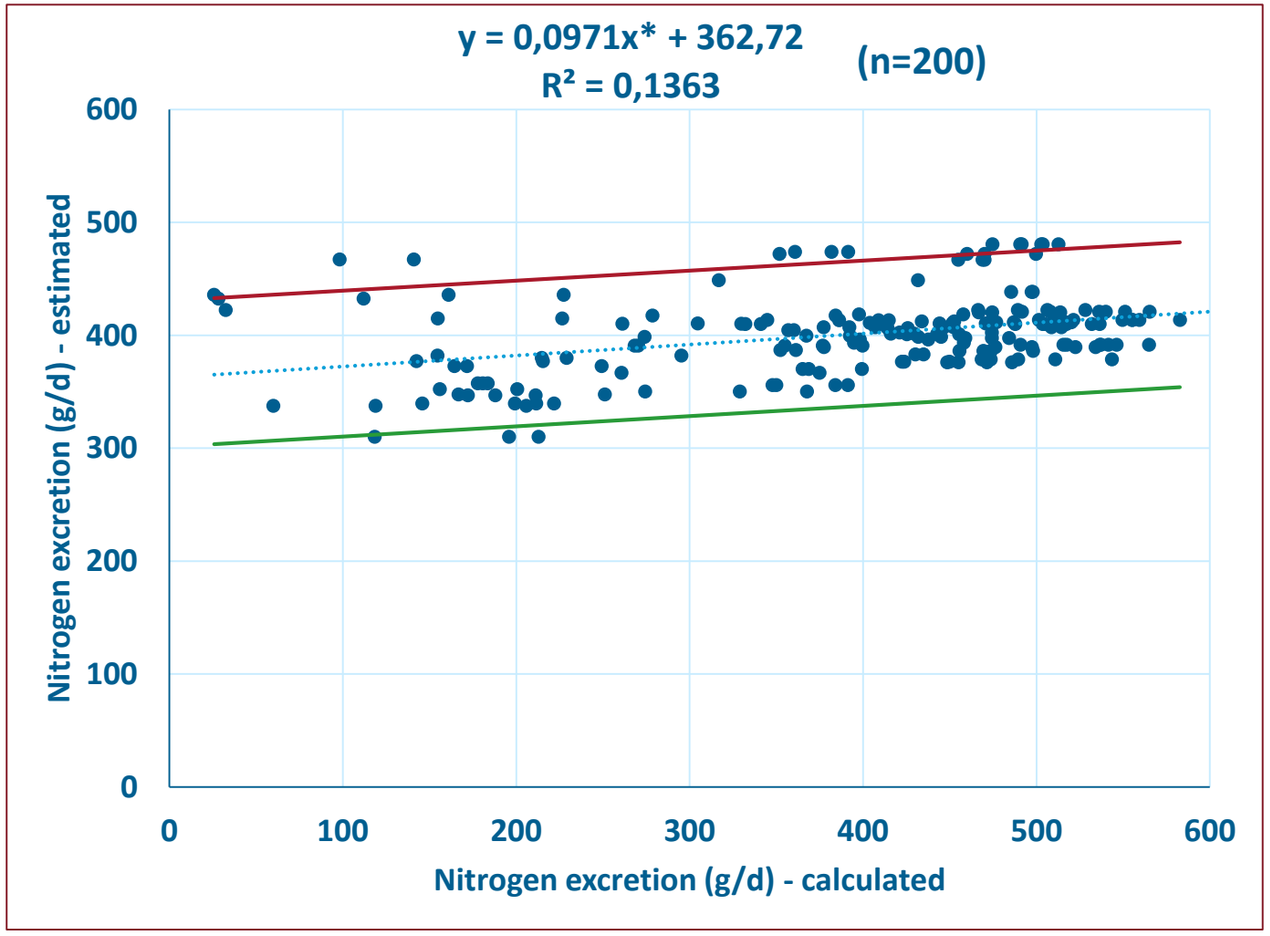
  - **feed intake per feeding group** (Farm **A** = daily, Farm **B**= weekly)

- **Data combination per feeding group → n=200 (Farm A), n=174 (Farm B)**

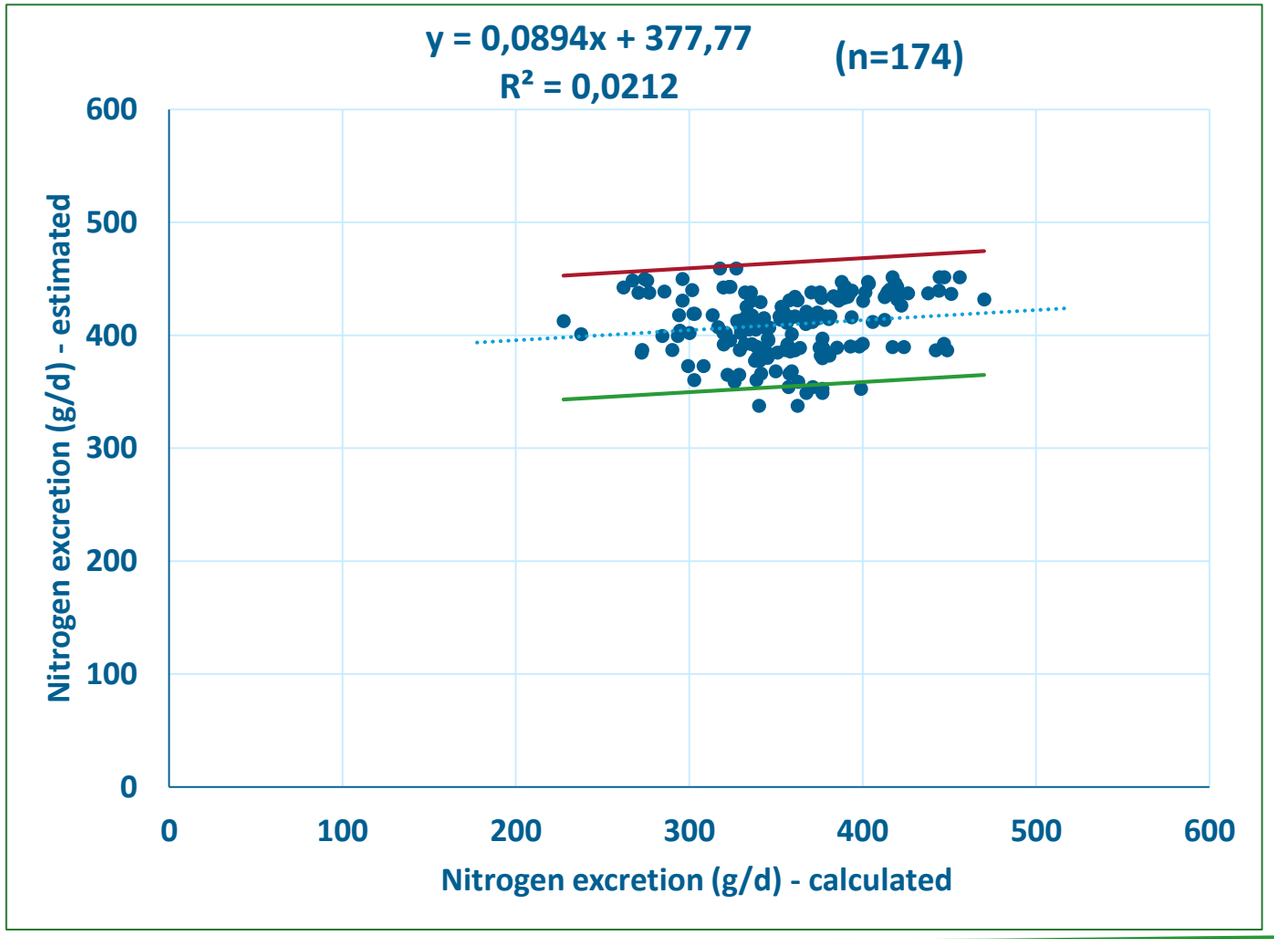
nitrogen excretion = (crude protein intake / 6.25) – (milk protein / 6.38)

Results → all feeding groups

Farm A



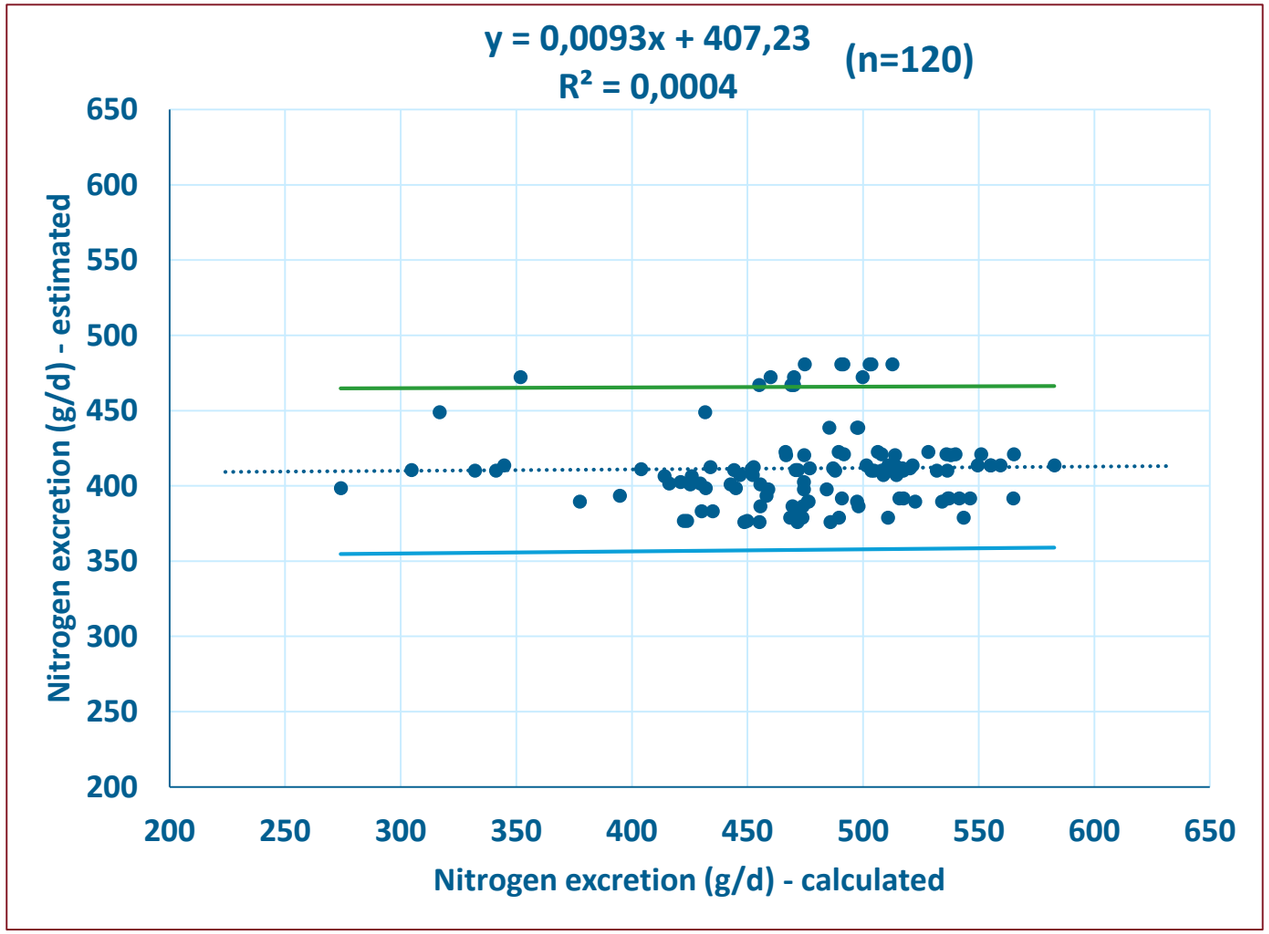
Farm B



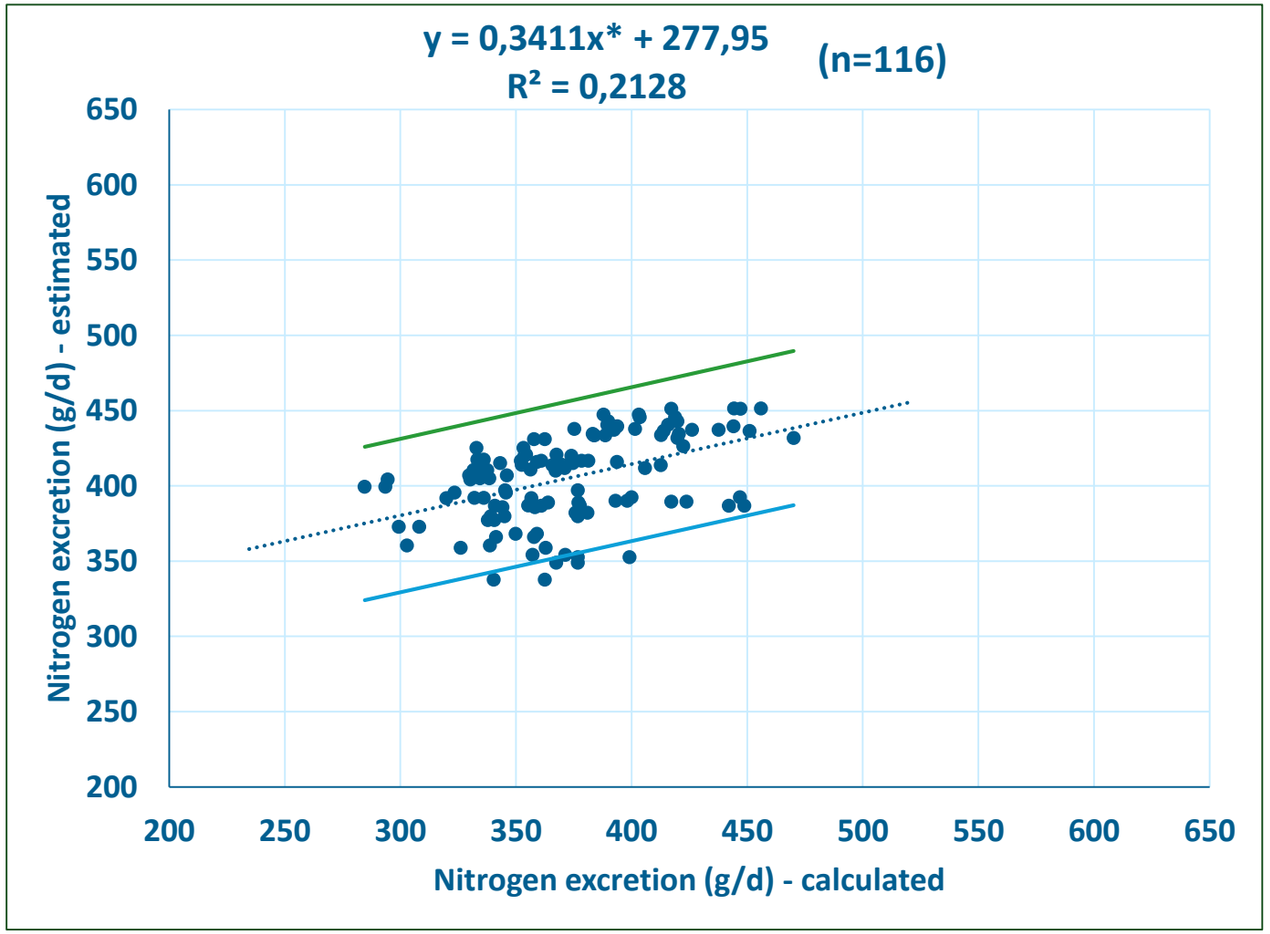
nitrogen excretion = (crude protein intake / 6.25) – (milk protein / 6.38)

Results → high yielding feeding groups only (without fresh and late lactation cows)

Farm A



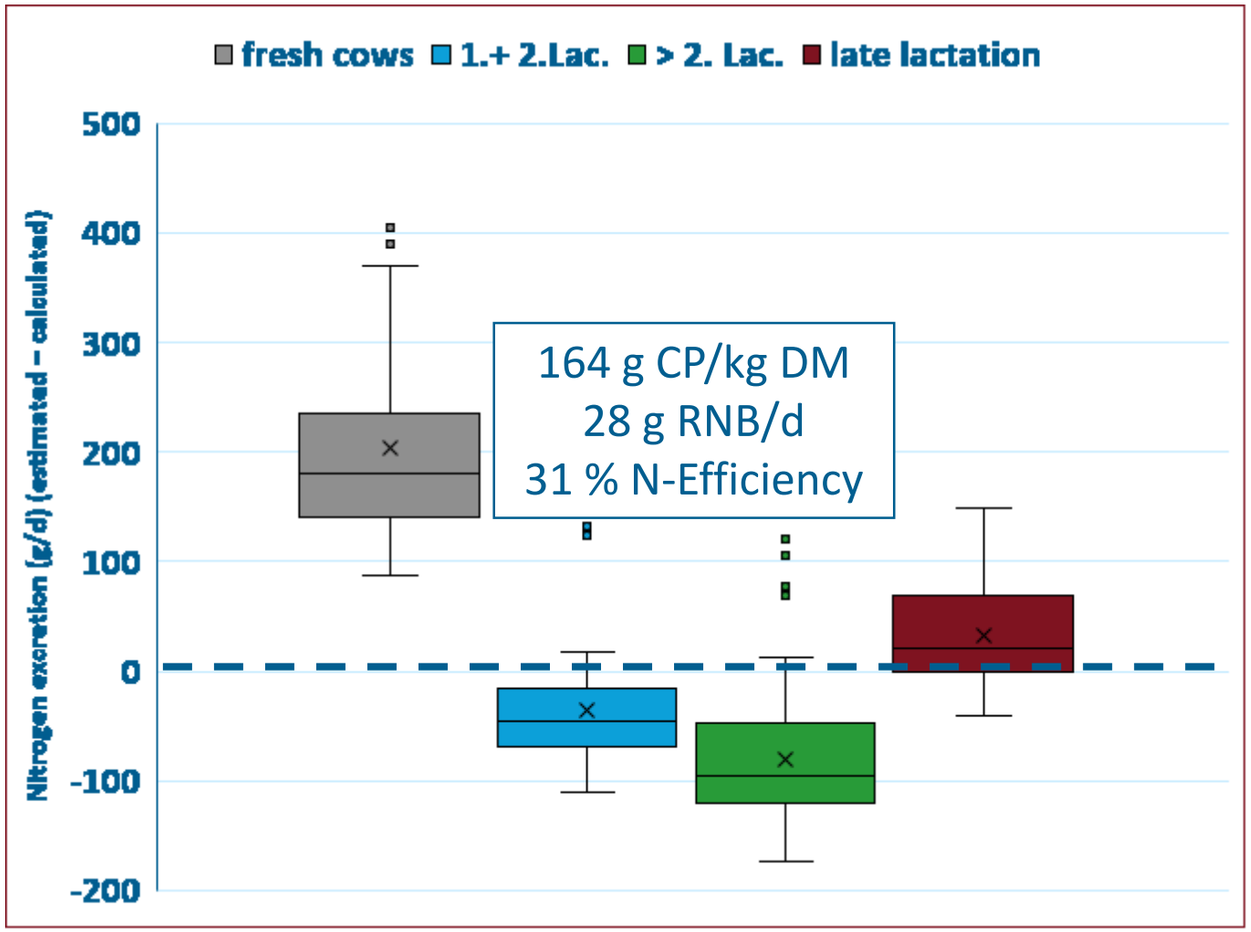
Farm B



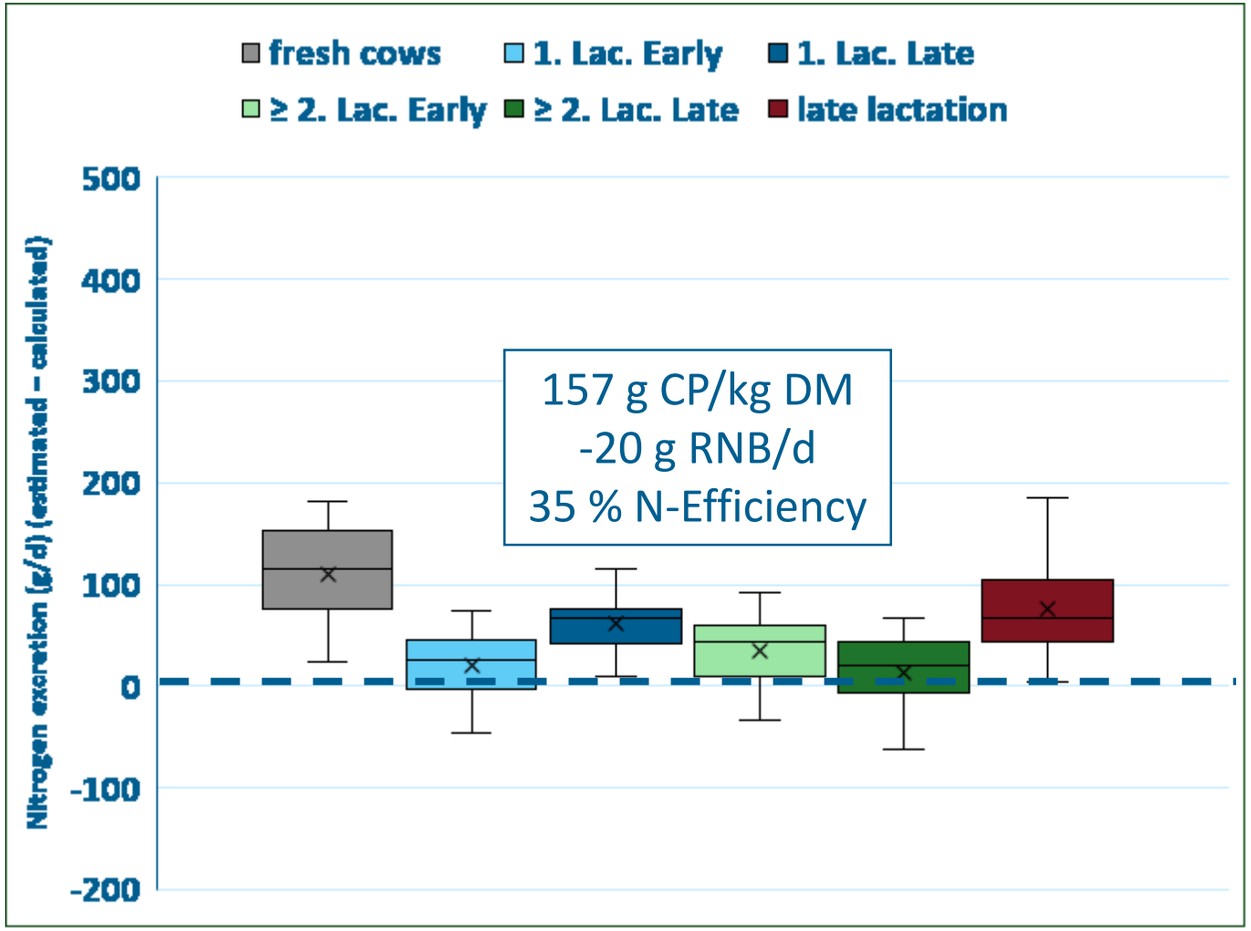
Differences between estimated and calculated nitrogen excretions

0: calculated=estimated; > 0: overestimated; < 0: underestimated

Farm A

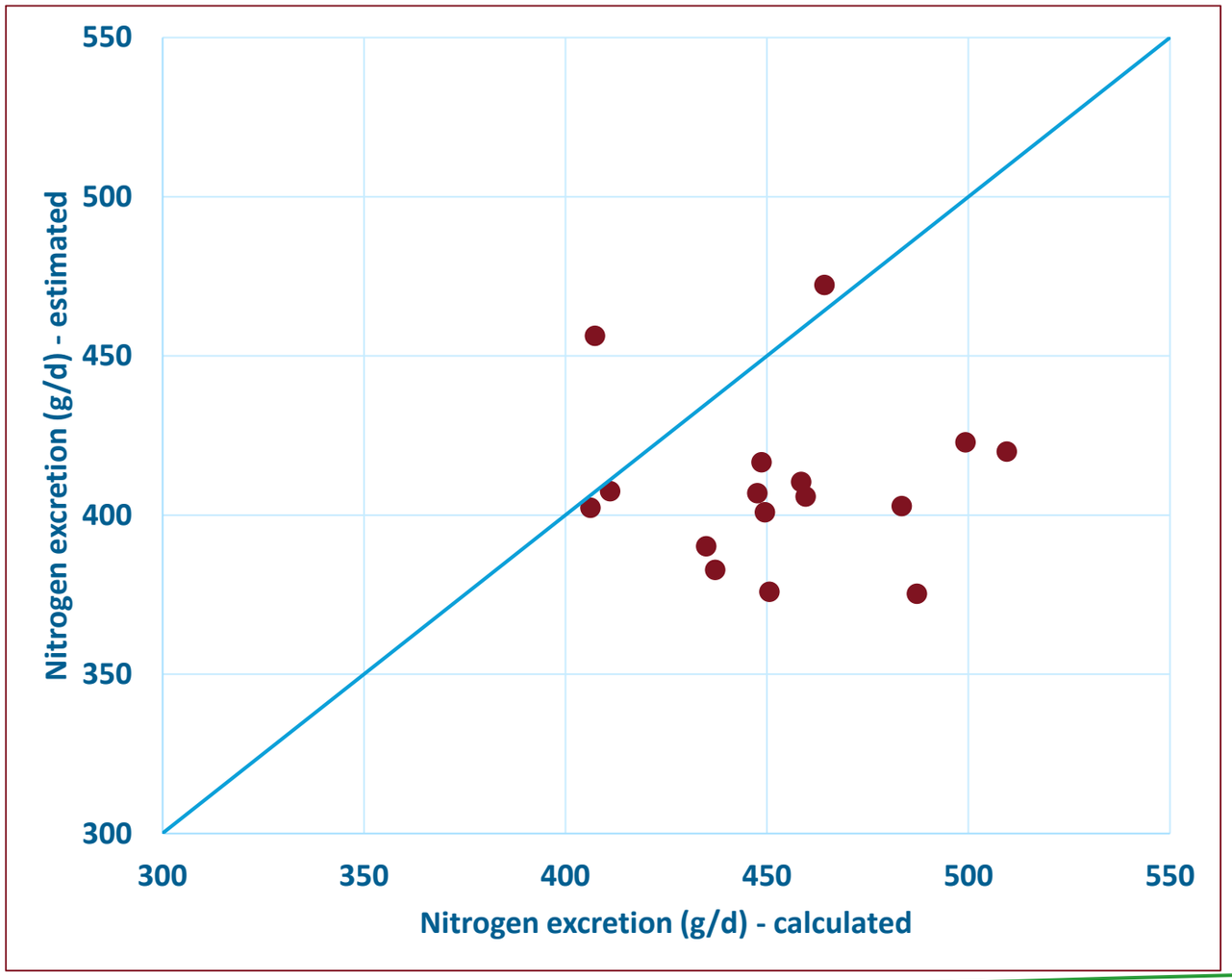


Farm B

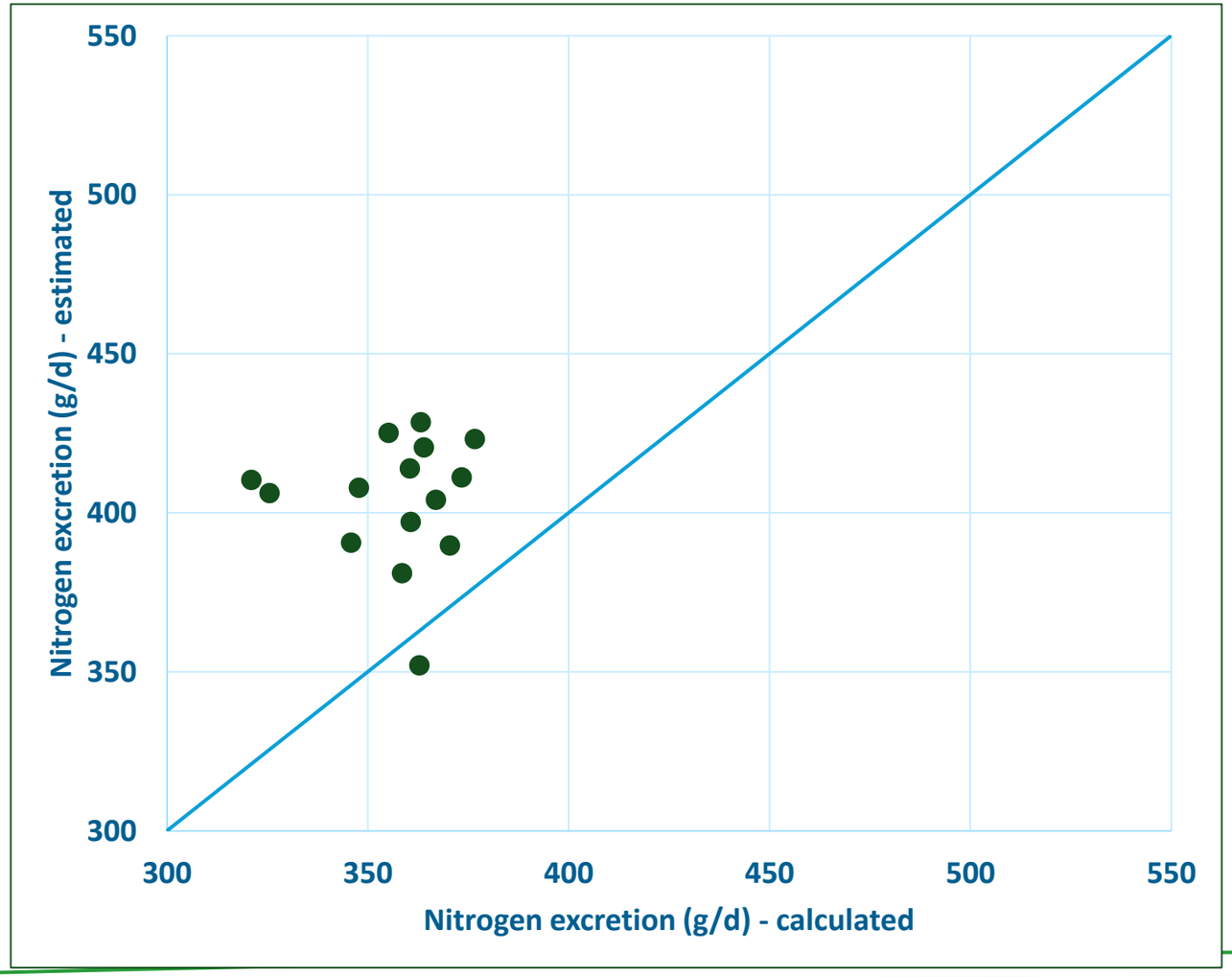


Use of weighted means per farm and month to prevent bias by feeding group (weighted by number of animals per feeding group)

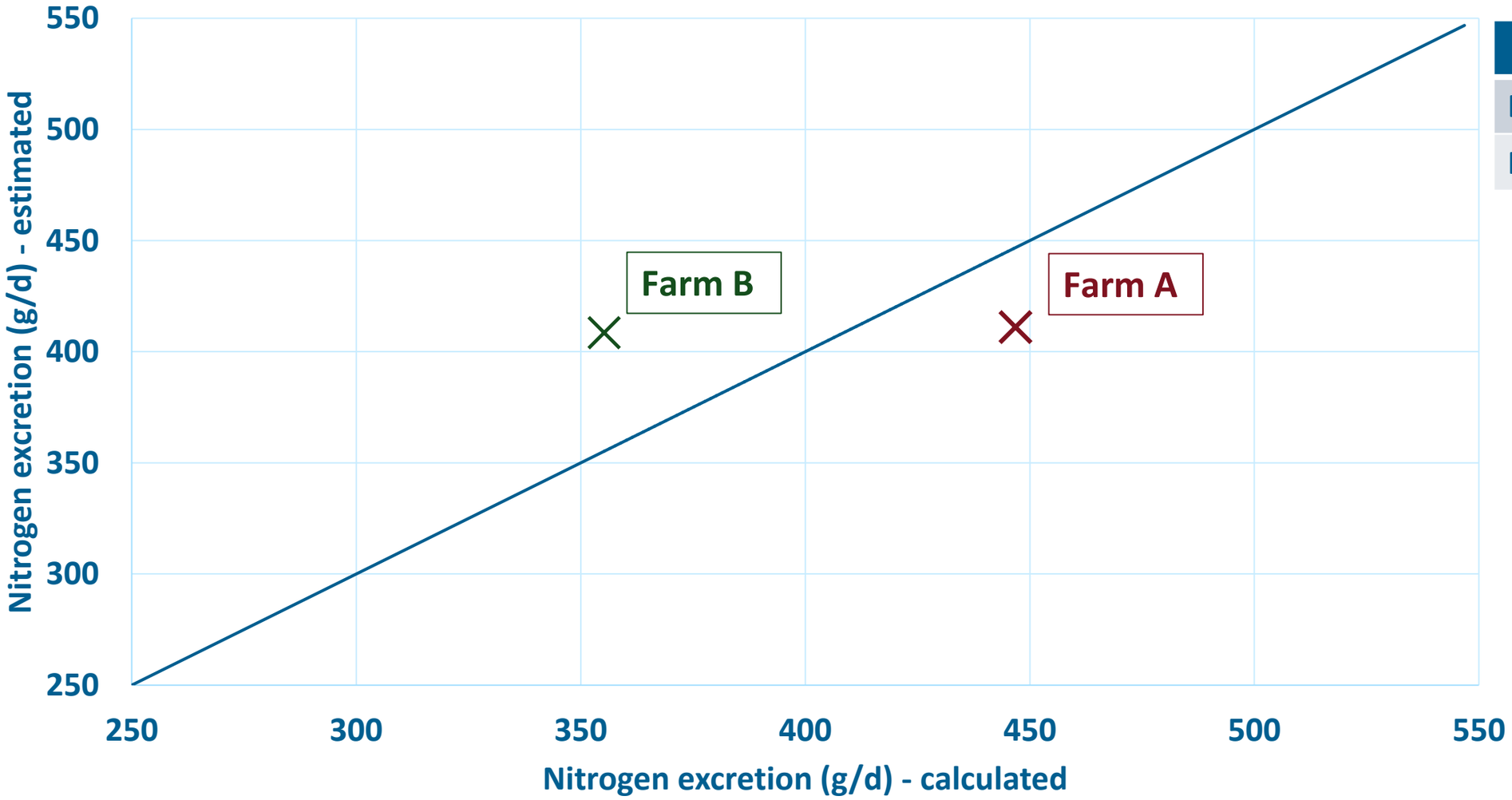
Farm A (n=16)



Farm B (n=15)



Averages of all available weighted means per months per farm (n=16/15)



	Farm A	Farm B
Bias %	- 9,7	13,3
RMSPE %	37,5	41

Conclusions

- Data from more farms is needed to reduce the influence of individual farms on average values
- **Quality of estimation** is strongly influenced by feeding group and the strategy of protein feeding of the herd
- Modelling of estimation equation based on data from **research stations where milk urea was analysed by reference method**

  -> feeding that **deviates from recommendations and analyse of milk urea by mid-infrared absorption** can cause deviating estimates
- Scope of application of the new equation: estimation of **nitrogen excretions at farm or county level**

  -> not suitable for evaluating individual feeding groups, but rather annual averages at farm level



Thank you for your attention!

Mecklenburg-Vorpommern

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