Association between metabolic status and methane production in dairy cows

Björn Kuhla

LEIBNIZ INSTITUTE
FOR FARM ANIMAL BIOLOGY

Nutritional Physiology
Oskar Kellner

Milk fat synthesis

Rumen

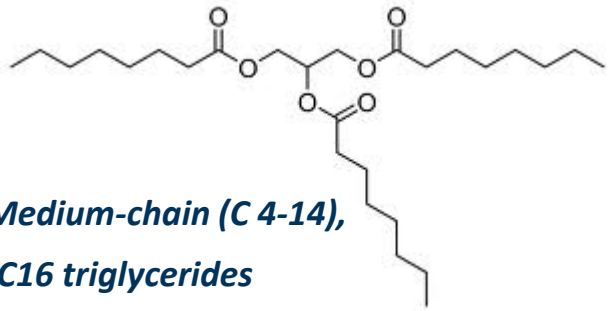
Adipose tissue

SCFA

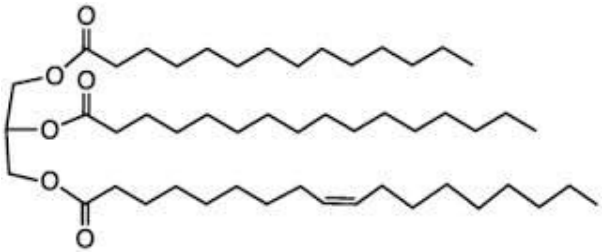
LCFA

de novo milk fat synthesis

milk fat synthesis from absorbed FA

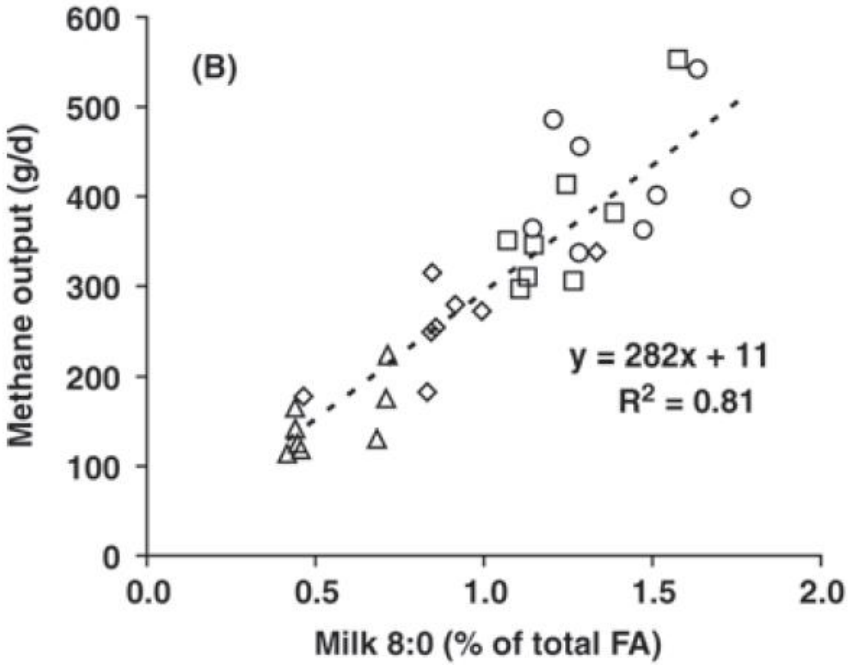


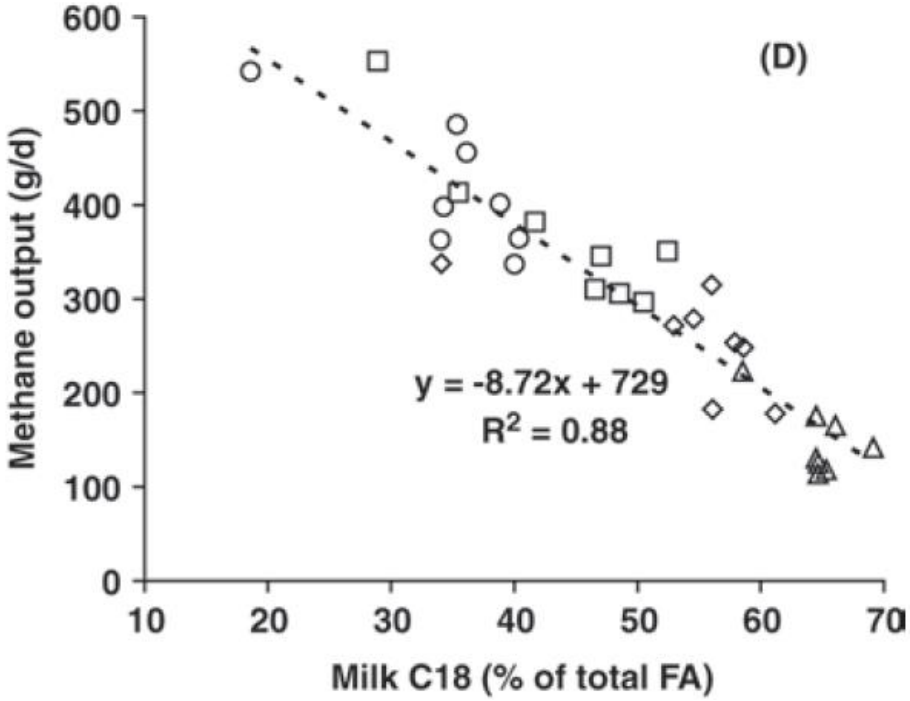
Short and Medium-chain (C 4-14), and C16 triglycerides



Long-chain triglycerides (C16, C18)

Correlation: Milk fat constitutes – CH_4





Synthesized from SCFA: positive

(Ac and But originate in the same pathway as CH_4)

Synthesized from LCFA: negative

Research question

Does the extent of fat mobilization

(increases plasma LCFA and milk LCFA-TG concentration in early lactation)

(a) affect the utilization of acetate (for *de novo* milk fat synthesis)**,**

(b) and consequently ruminal methane production ?

Dairy cows in early lactation

Experimental design

Respiration Chamber

Feaces

Milk

Blood

TiO_2

Far-off Close-up Lactation

n=20

-4 4 8 12 16 20 24 28 32 36 40

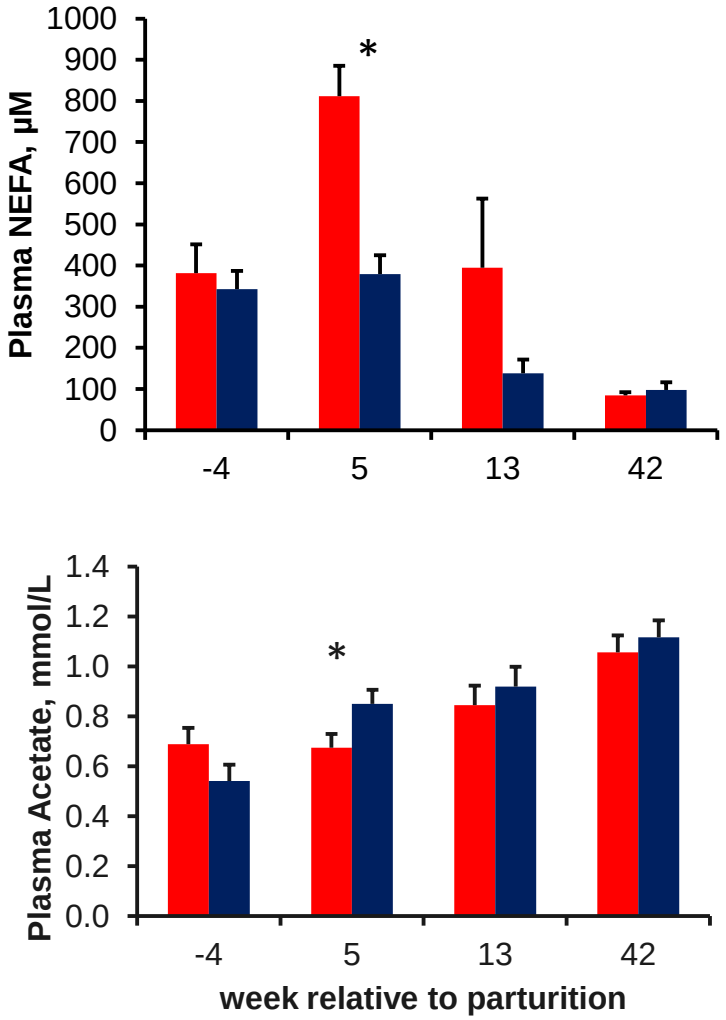
Calving

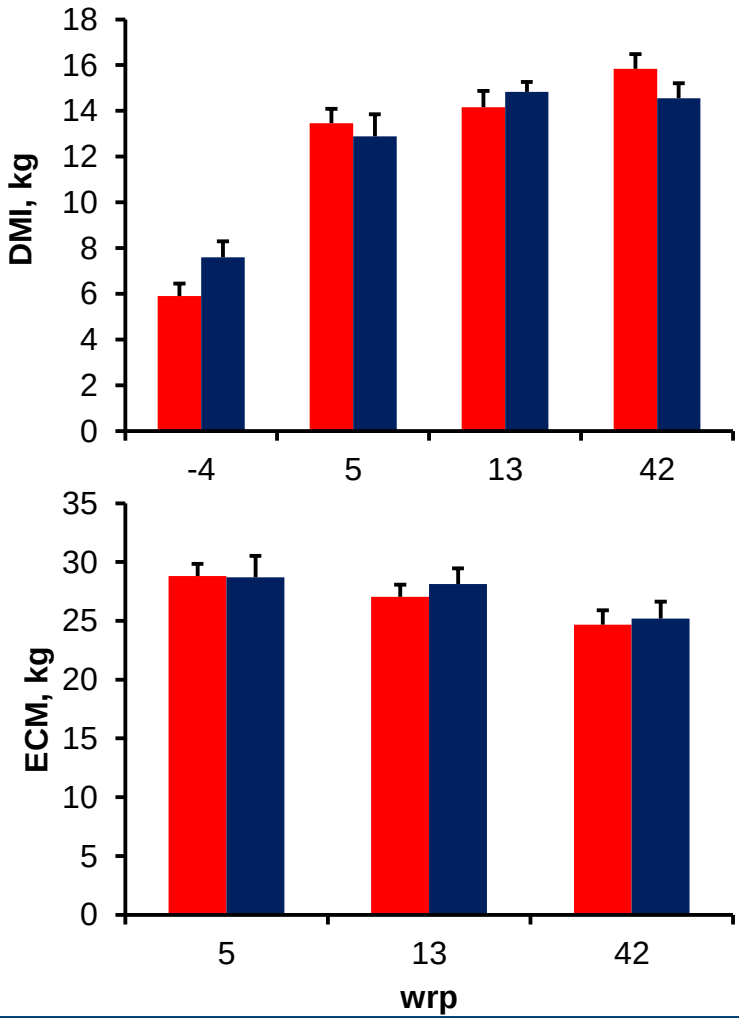
Rumen fluid

Week relative to parturition

Dairy cows in early lactation

High mobilizing
Low mobilizing

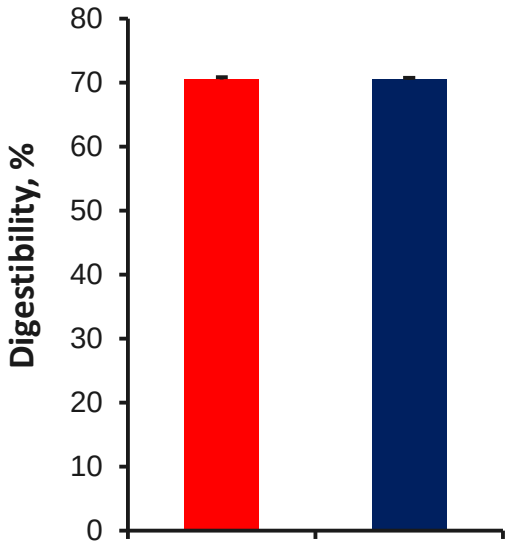


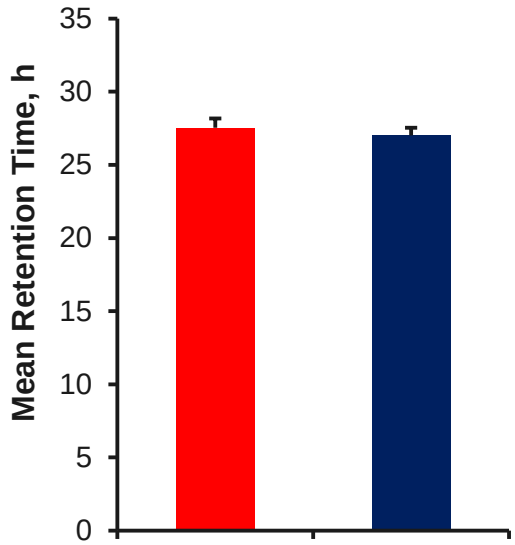


Dairy cows in early lactation

High mobilizing
Low mobilizing

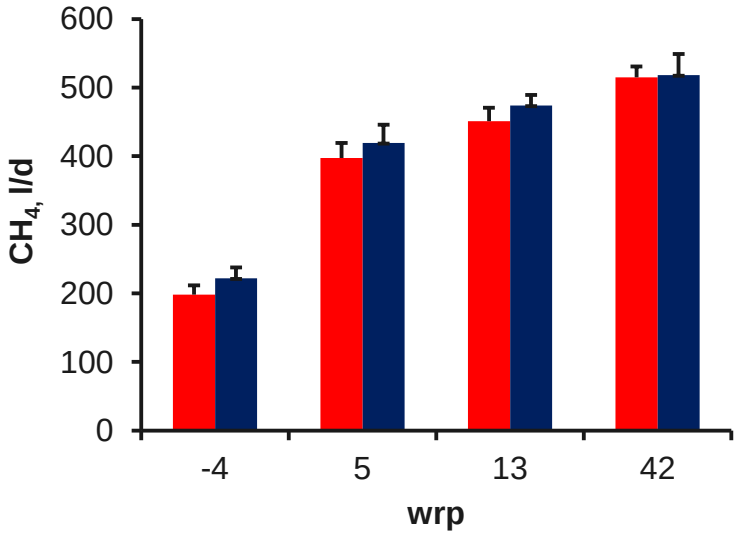
Week 6 post partum

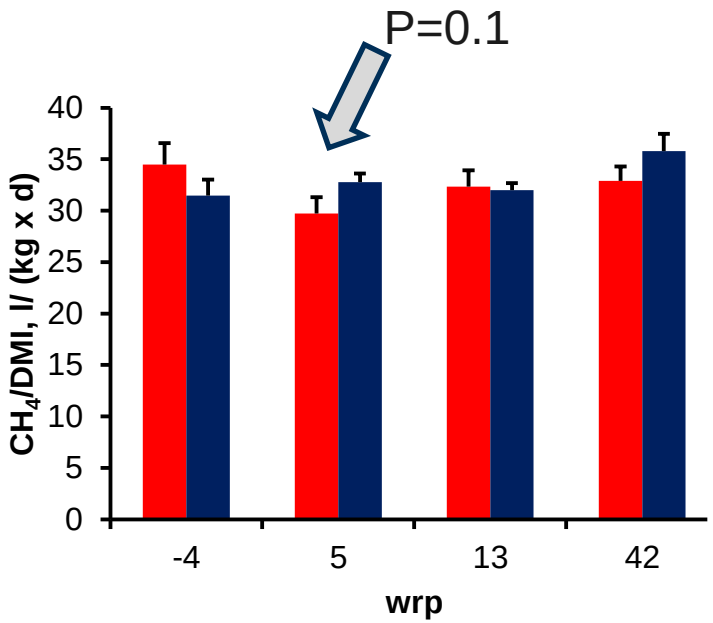




Dairy cows in early lactation

High mobilizing
Low mobilizing

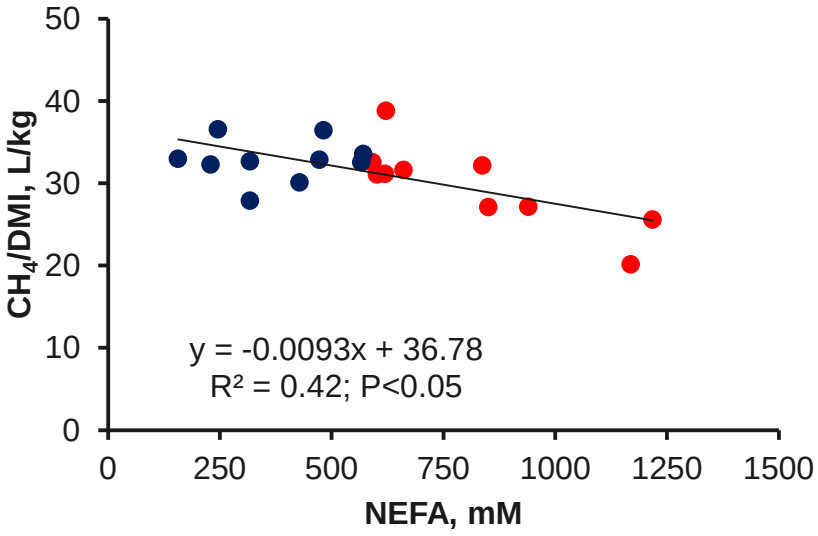


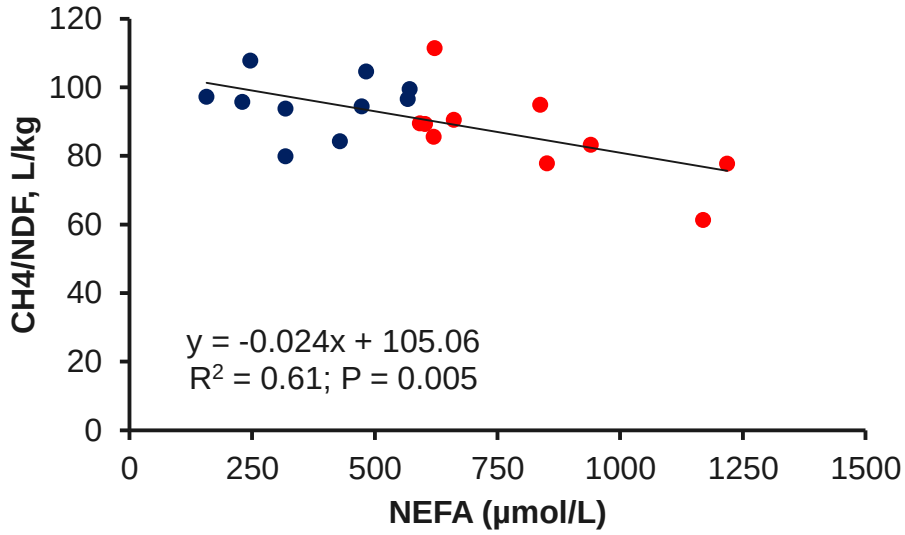


Dairy cows in early lactation

High mobilizing
Low mobilizing

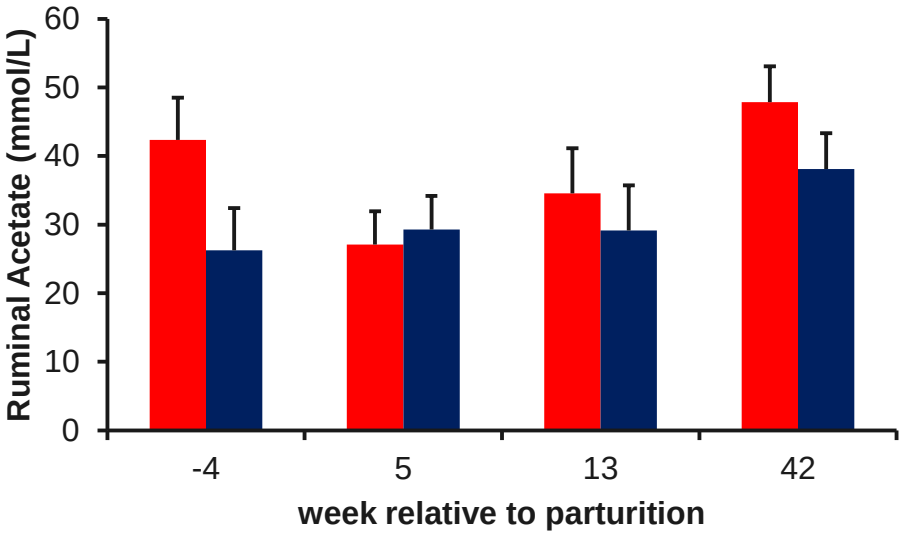
Week 5 post partum

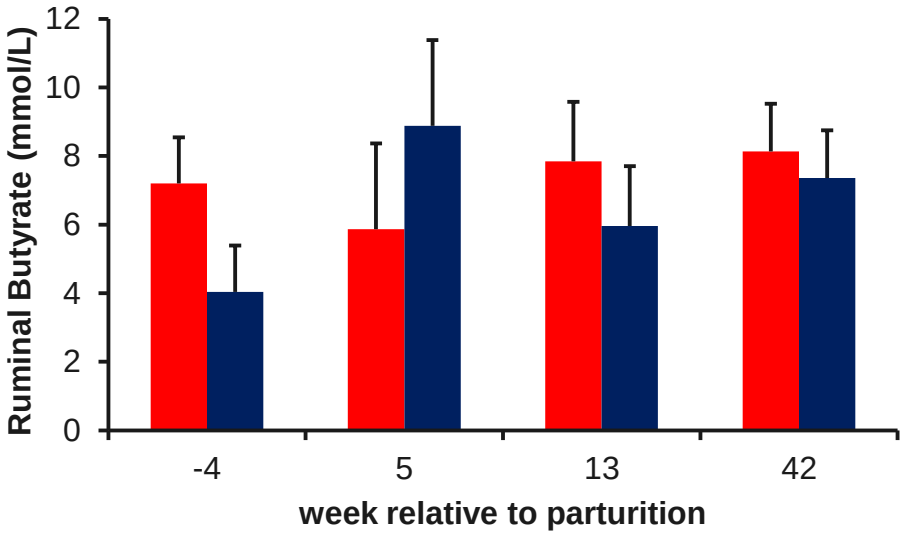




Dairy cows in early lactation

High mobilizing
Low mobilizing



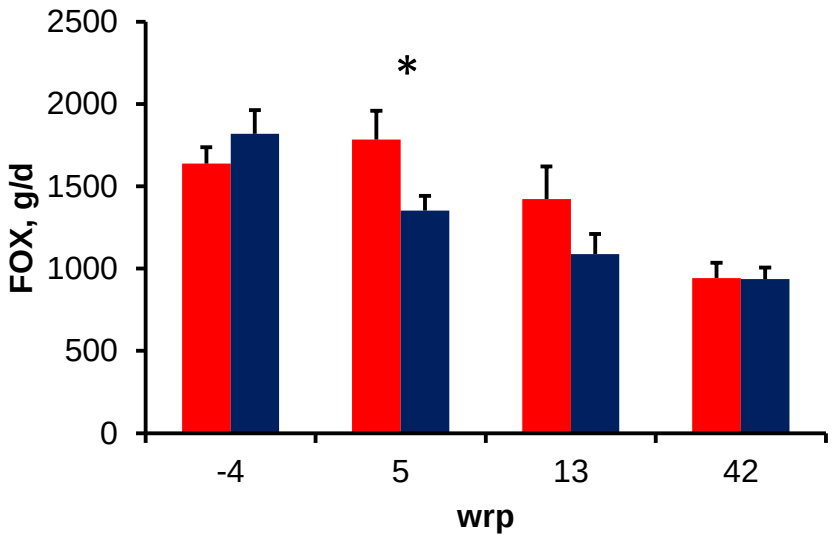


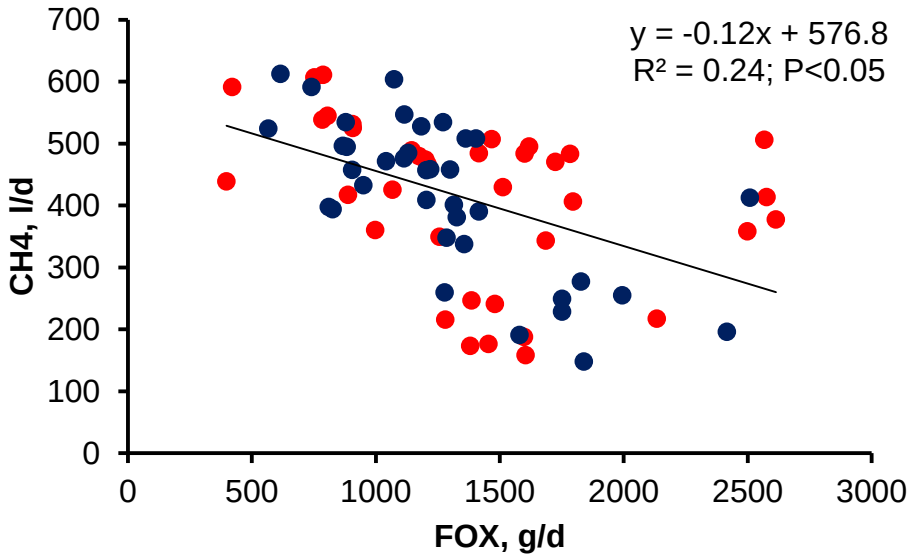
Dairy cows in early lactation

High mobilizing
Low mobilizing

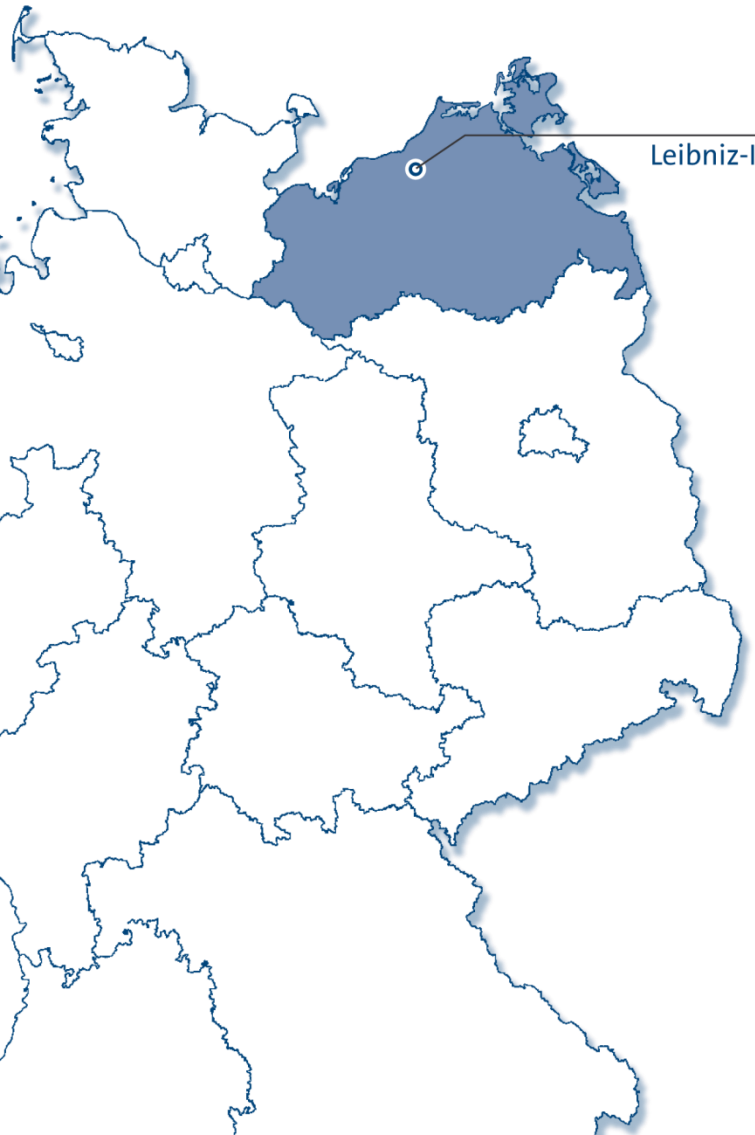
Fat oxidation (FOX)

FOX (g) = 1.69 V_{O2} (L) – 1.69 $V_{CO2\ metab.}$ (L)





Lipolysis and Fat metabolism of the host clearly associated with ruminal CH_4 !



Leibniz Institute for Farm Animal Biology (FBN)

Wilhelm-Stahl-Allee 2
18196 Dummerstorf

Contact

PD Dr. Björn Kuhla

Phone: +49 38208 68 695
Fax: +49 38208 68 652
E-Mail: b.kuhla@fbn-dummerstorf.de
Internet: www.fbn-dummerstorf.de