FEED EFFICIENCY AND METHANE EMISSION FROM HOLSTEIN AND JERSEY COWS

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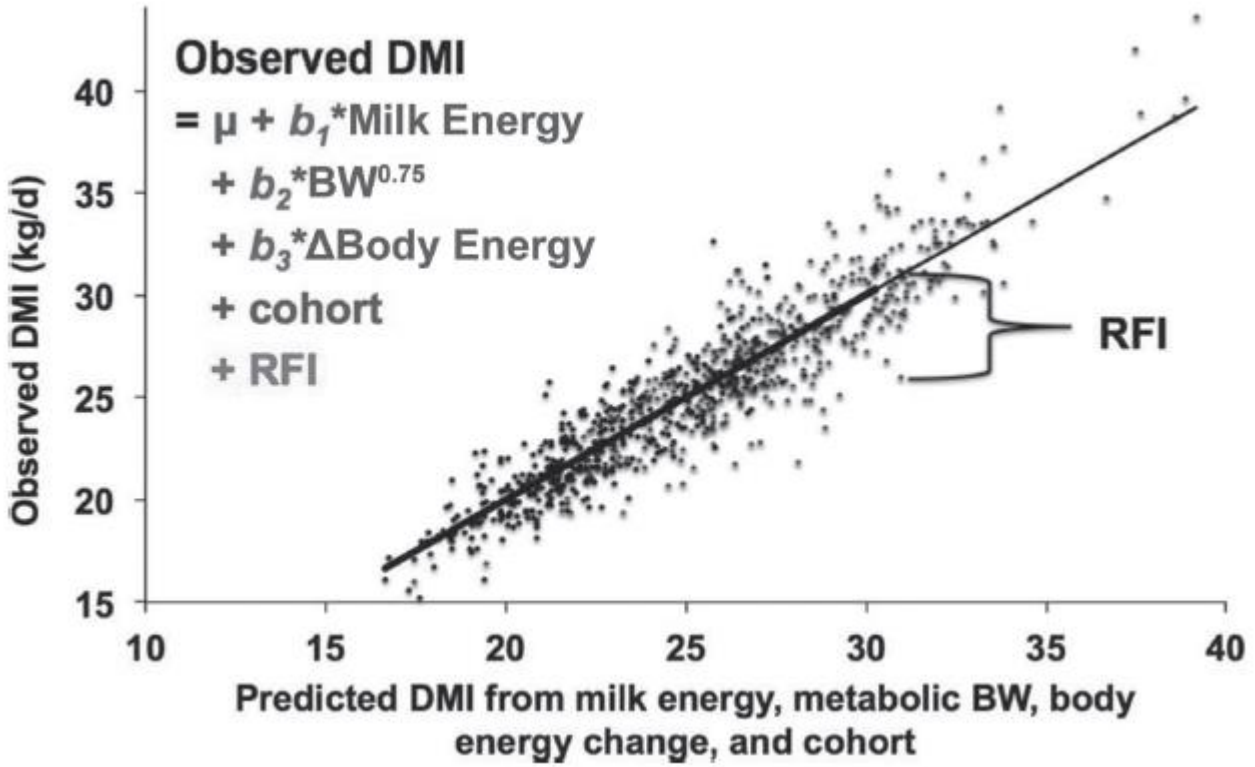
RESIDUAL FEED INTAKE

Residual feed intake (RFI)

- Predict DMI based on energy sinks
- RFI = observed DMI – predicted DMI
- Negative RFI → efficient
- Positive RFI → inefficient

Is an energy-efficient animal low in methane?



VandeHaar et al. (2016)

EXPERIMENT IN FOULUM

- Do Holstein and Jersey differ in methane production pr kg DMI og ECM?
- Do they respond similar to a given well known methane reducing feeding strategy?
- What is the relationship between RFI and methane?

EXPERIMENT IN FOULUM

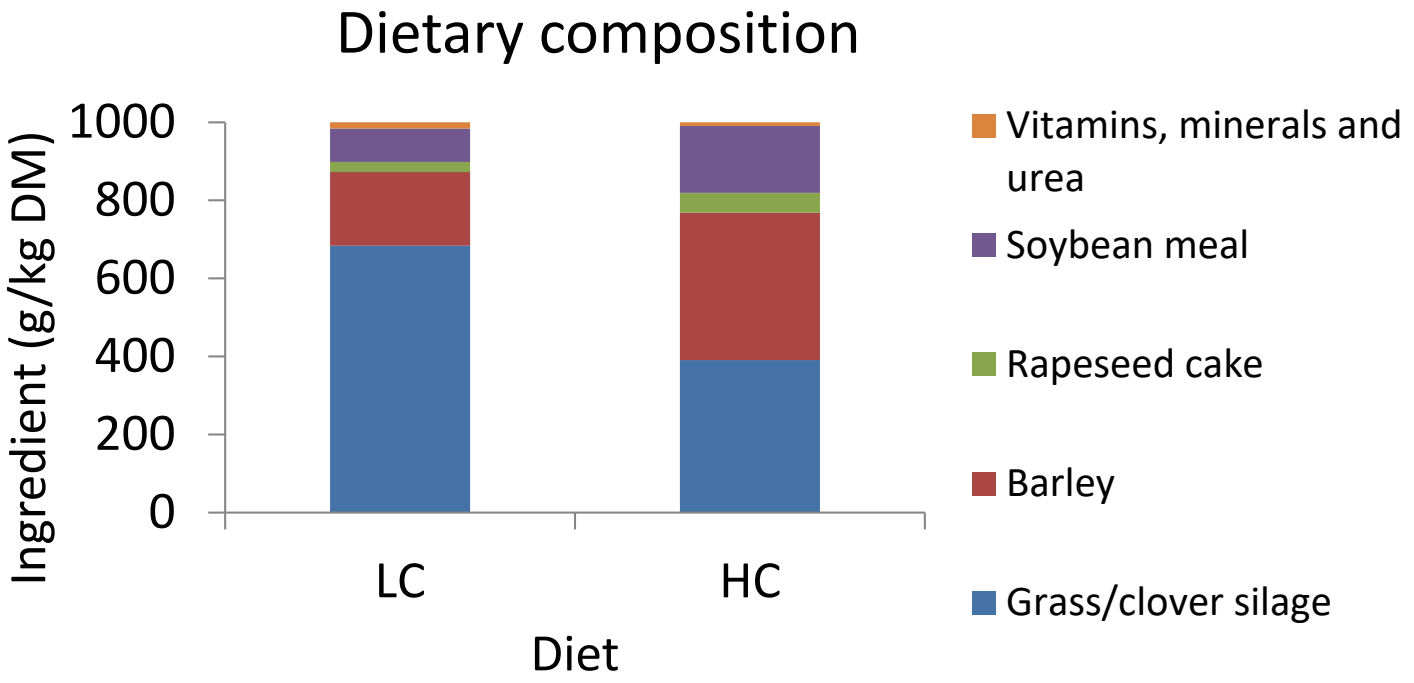
- Experimental design: cross-over with back-cross = 3 periods
- RFI defined prior to the experiment

	Holstein	Jersey
No. cows	10	10
No. cows per RFI group	5 high and 5 low RFI	5 high and 5 low RFI
Parity	1-3	1-3
DIM (d)	190±41	184±38
ECM yield (kg)	33.1±8.4	22.4±5.0
BW (kg)	663±71	487±35

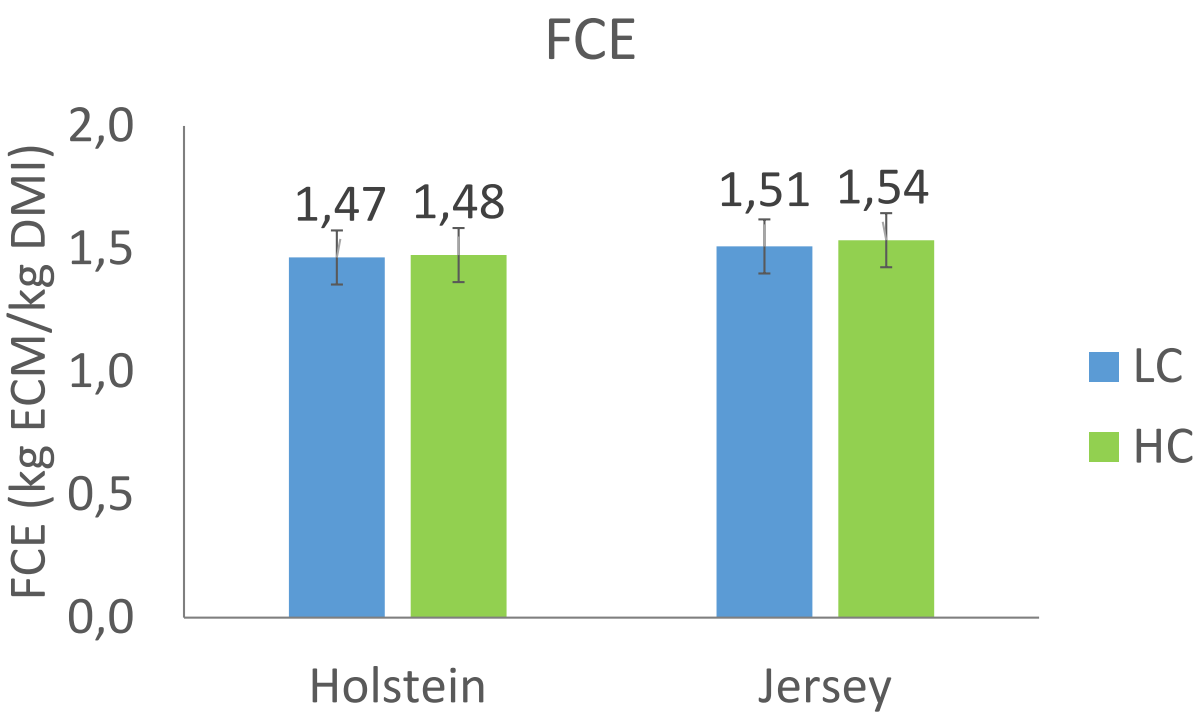
Olijhoek et al. (in press)

EXPERIMENT IN FOULUM

- Diets:
  - Low concentrate (LC):
    - Forage:concentrate of 68:32
    - Starch: 105 g/kg DM
  - High concentrate (HC):
    - Forage:concentrate of 39:61
    - Starch: 218 g/kg DM

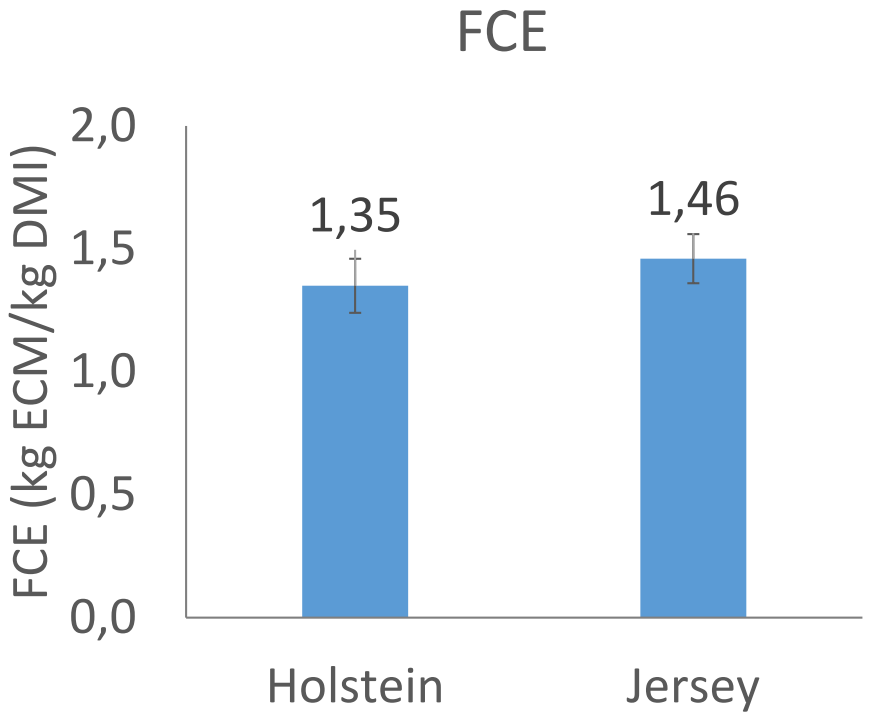


FEED CONVERSION EFFICIENCY



Olijhoek et al. (in press)

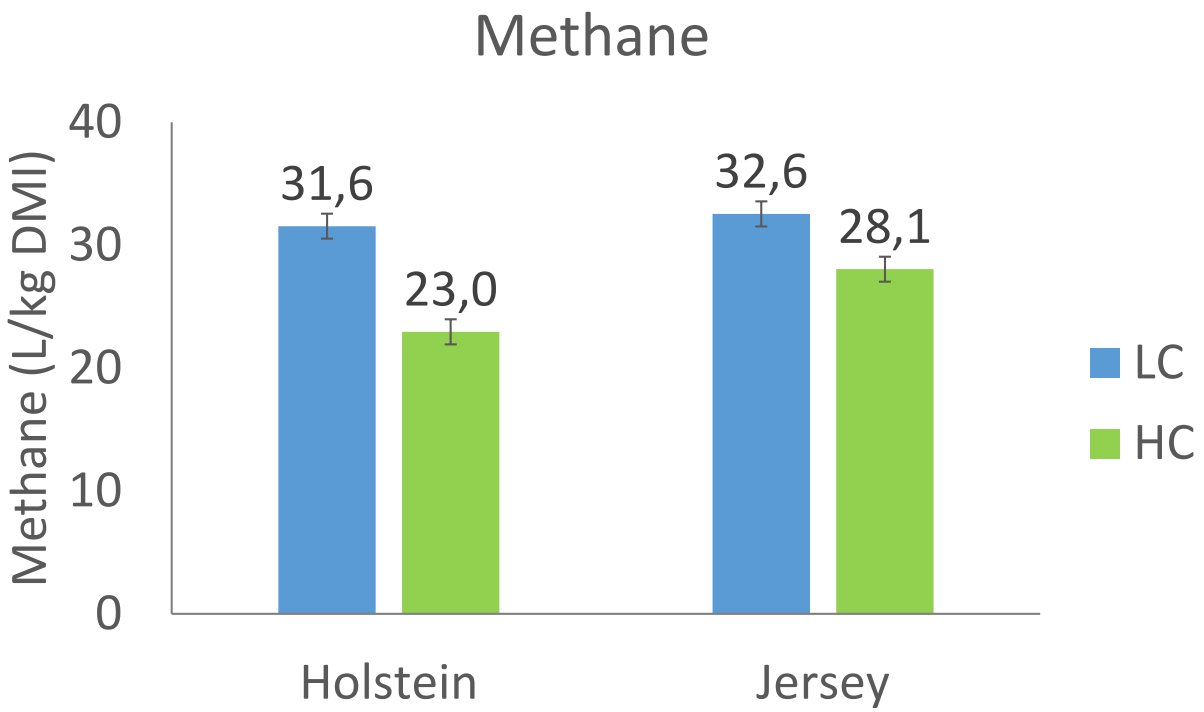
Diet: P = 0.10
Breed: P = NS



Kristensen et al. (2015)

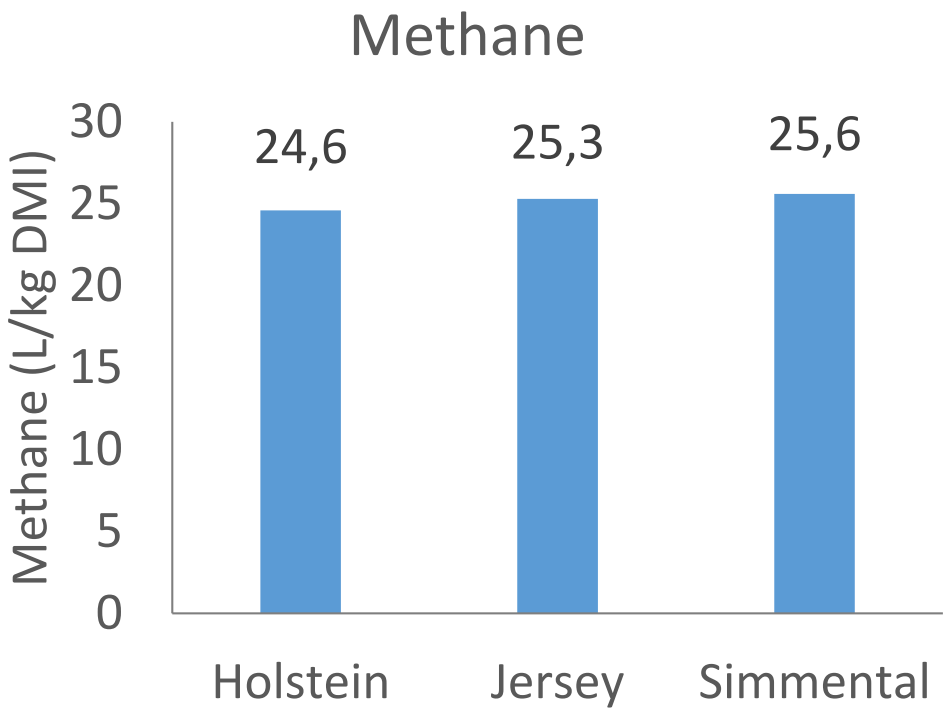
Breed: P < 0.05

METHANE PRODUCTION PER KG DMI



Olijhoek et al. (in press)

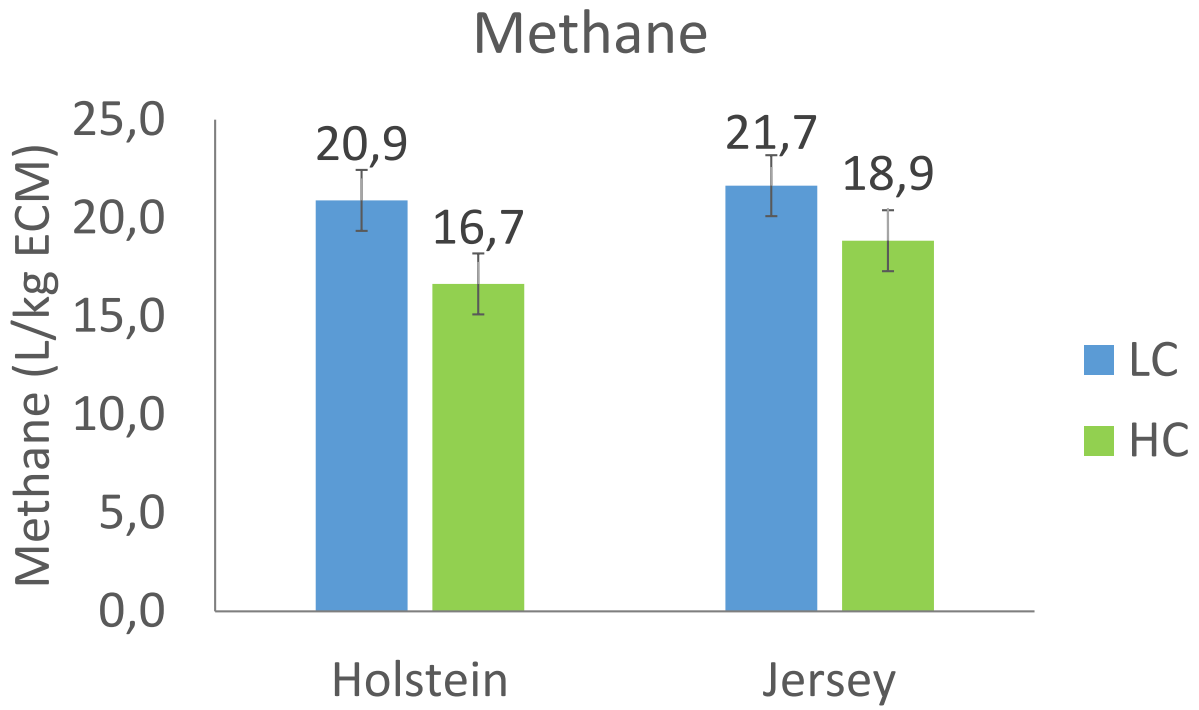
Diet: P < 0.001
Breed: P = 0.001
Breed x diet: P < 0.001



Münger and Kreuzer (2006)

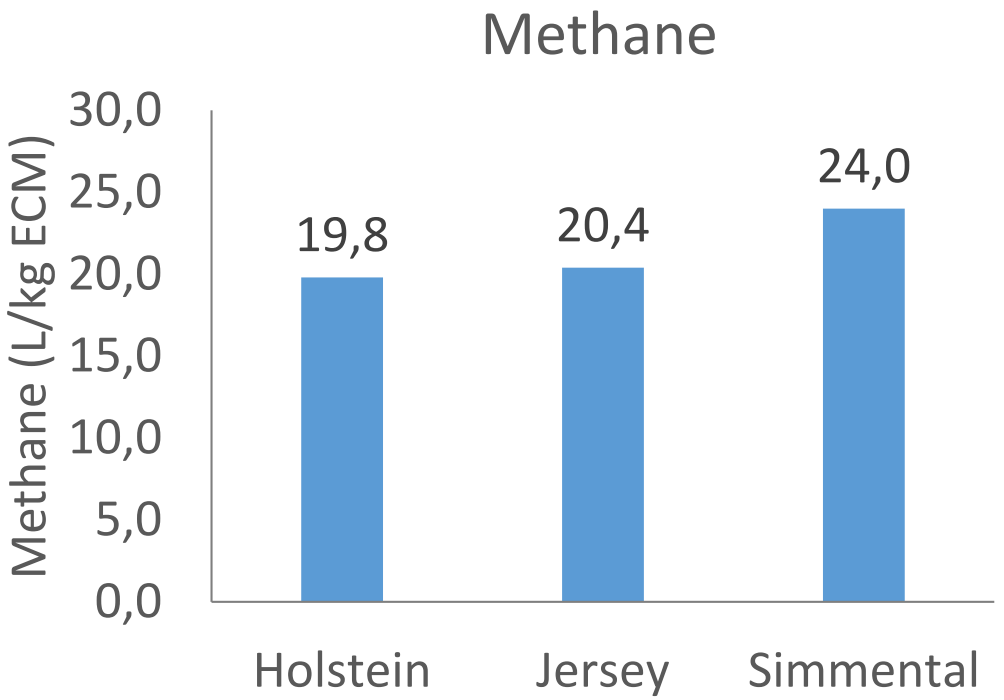
Breed: P = NS

METHANE PRODUCTION PER KG ECM (NOT PRODUCTION STUDY)



Olijhoek et al. (in press)

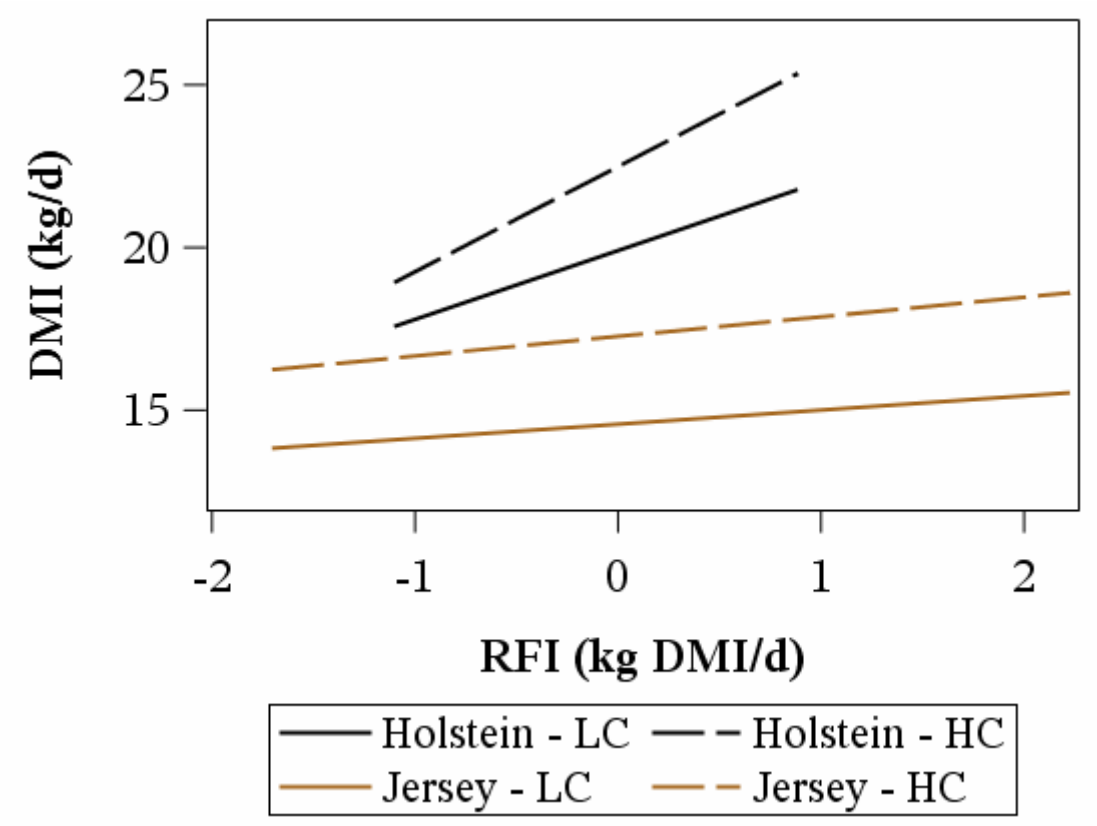
Diet: P < 0.001
Breed: P = 0.29
Breed x diet: P = 0.10

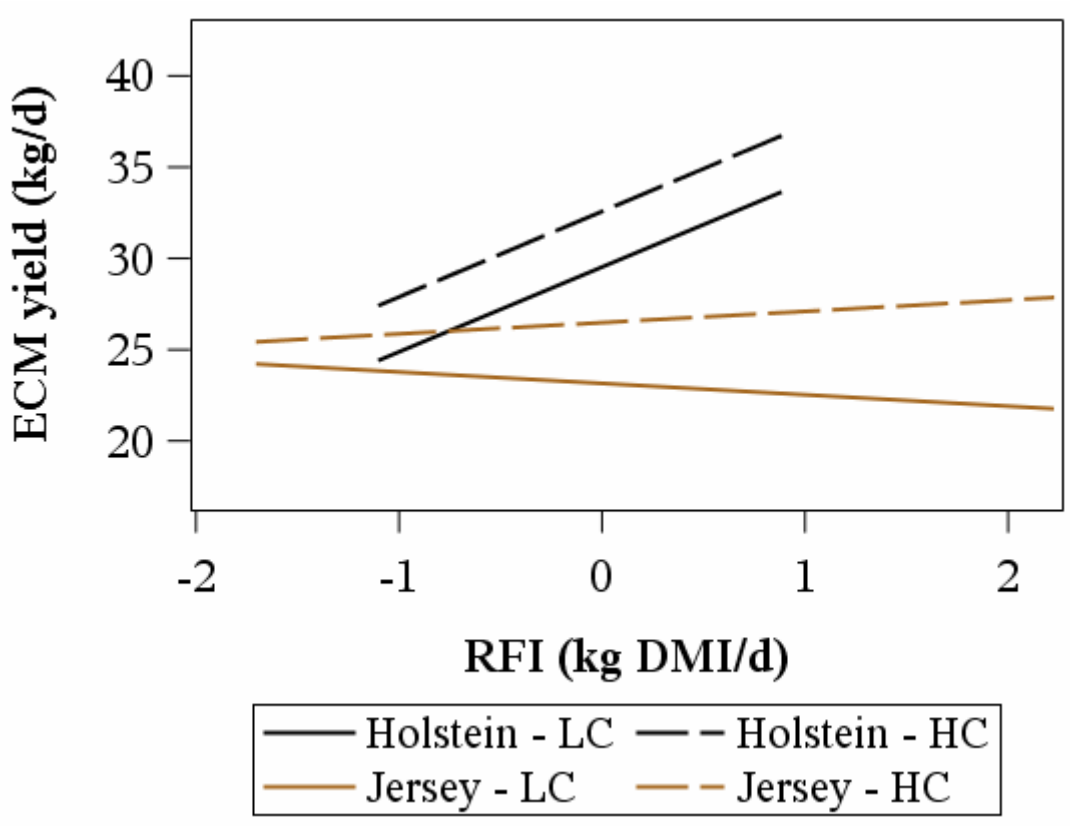


Münger and Kreuzer (2006)

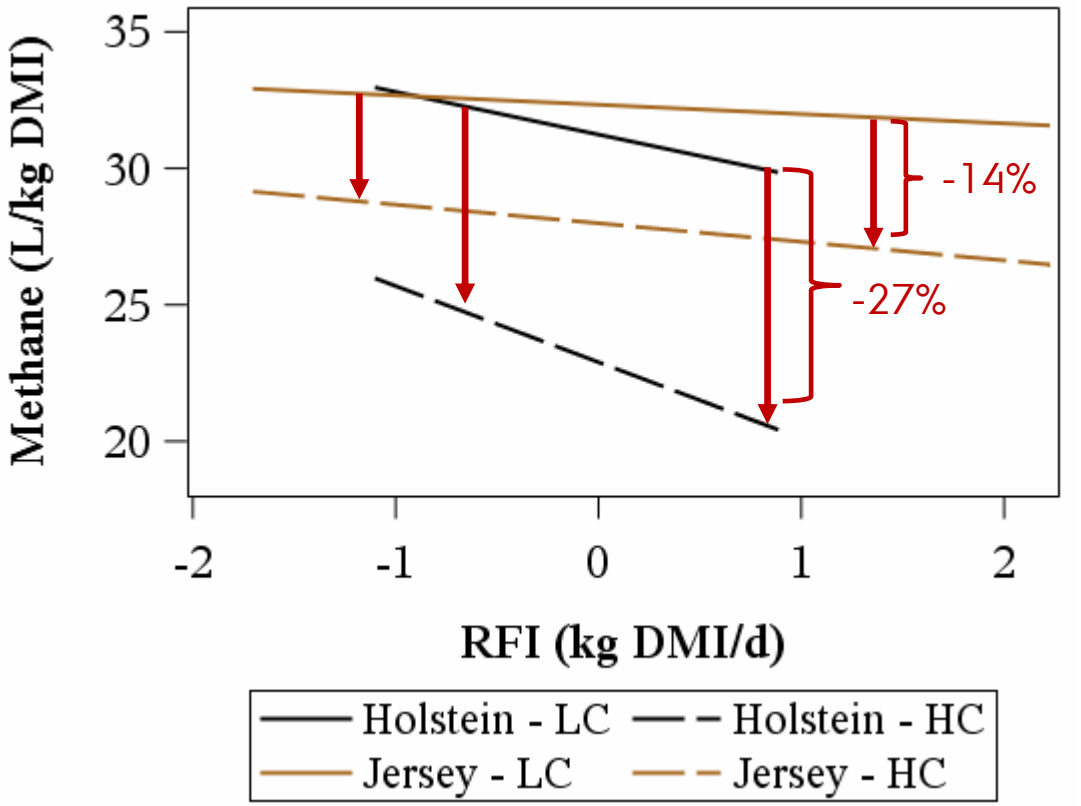
Breed: P < 0.001

RELATION BETWEEN RFI AND DMI & RFI AND ECM

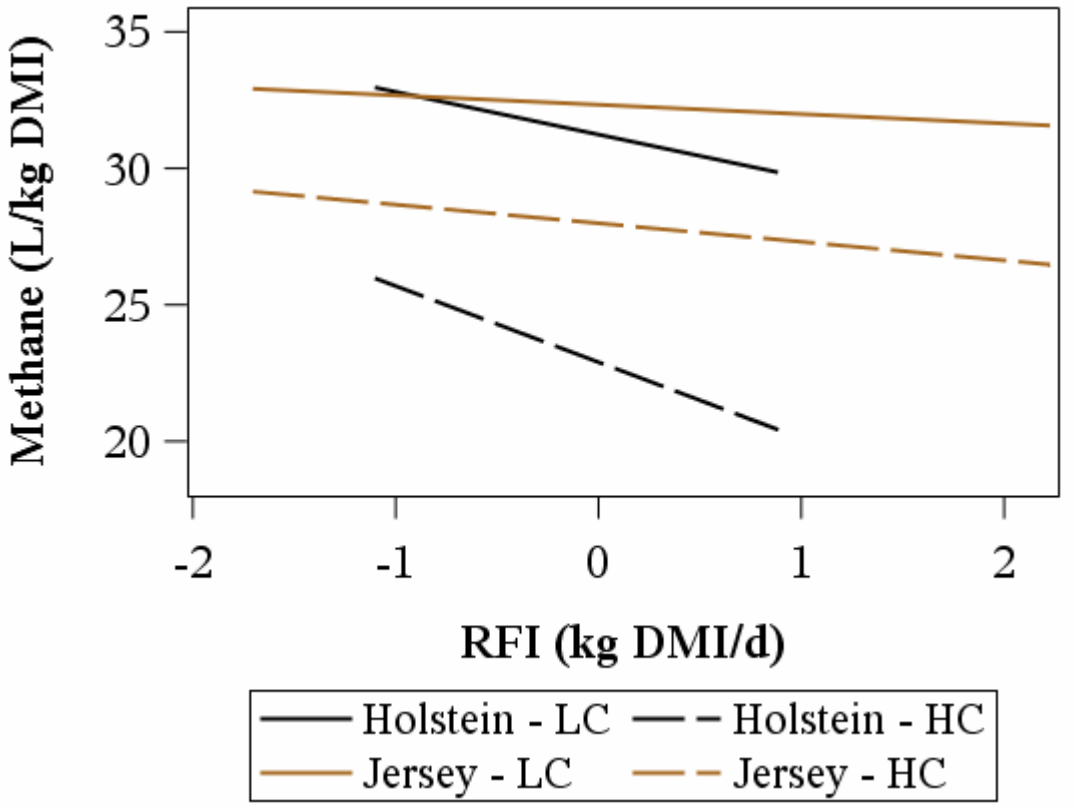




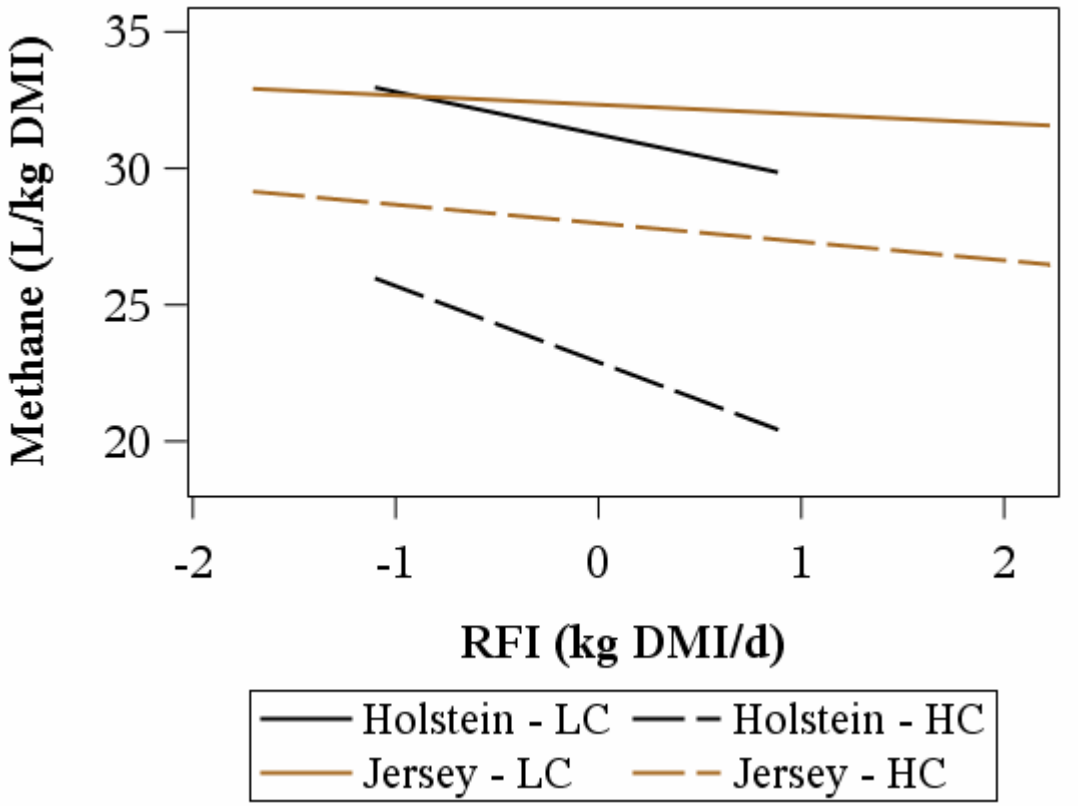
RELATION BETWEEN RFI AND METHANE

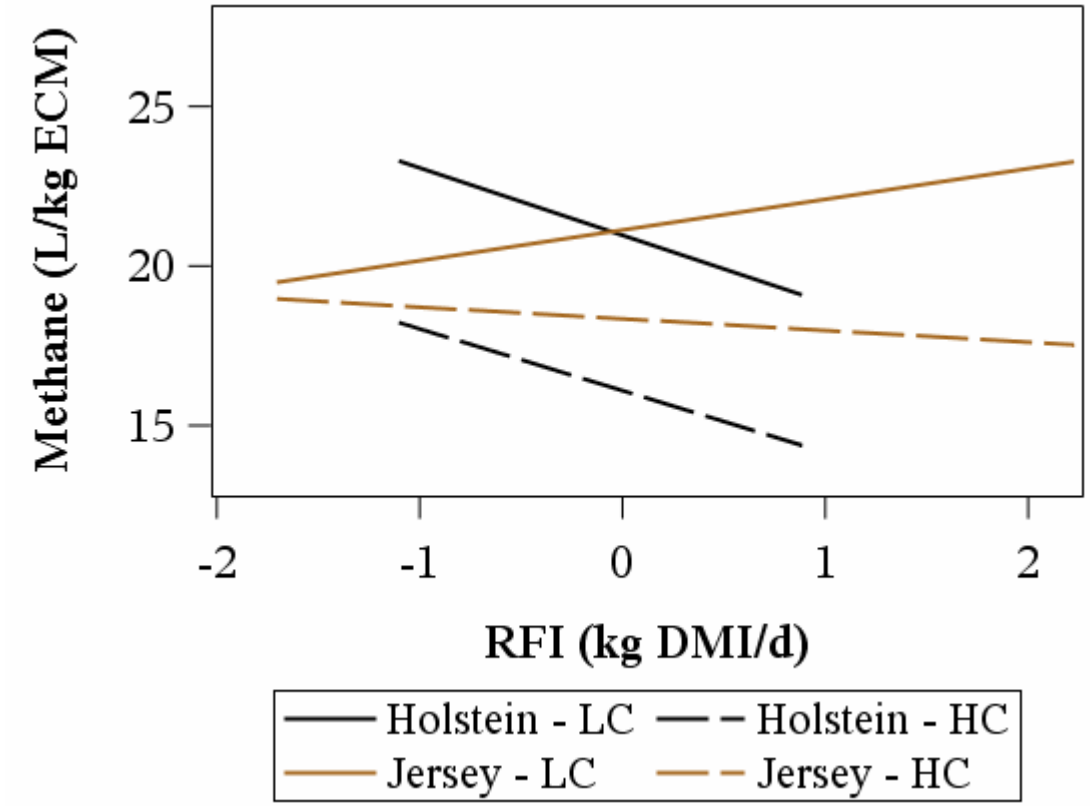


RELATION BETWEEN RFI AND METHANE

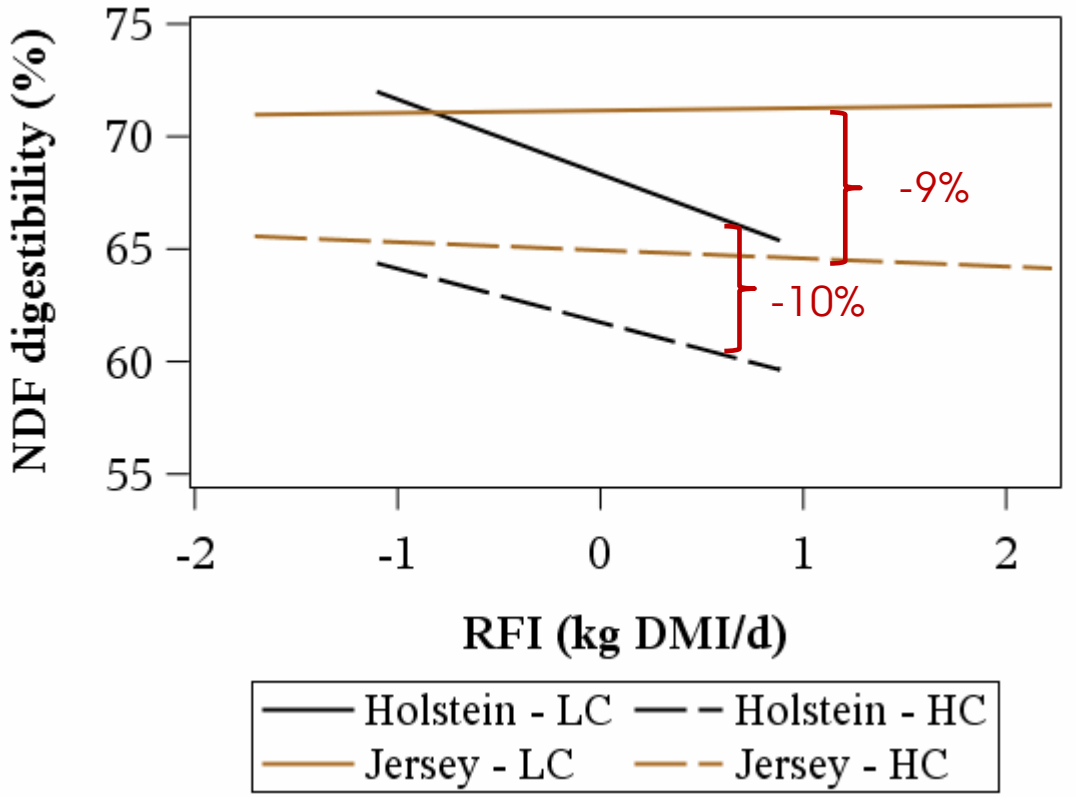


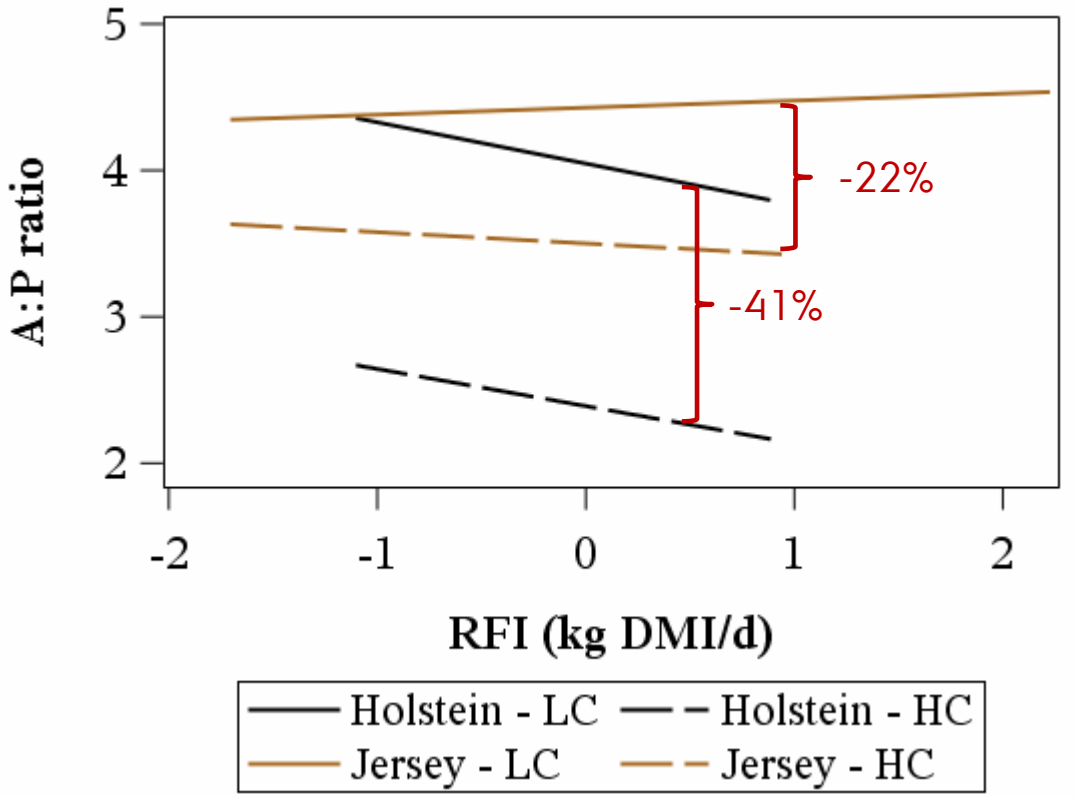
RELATION BETWEEN RFI AND METHANE



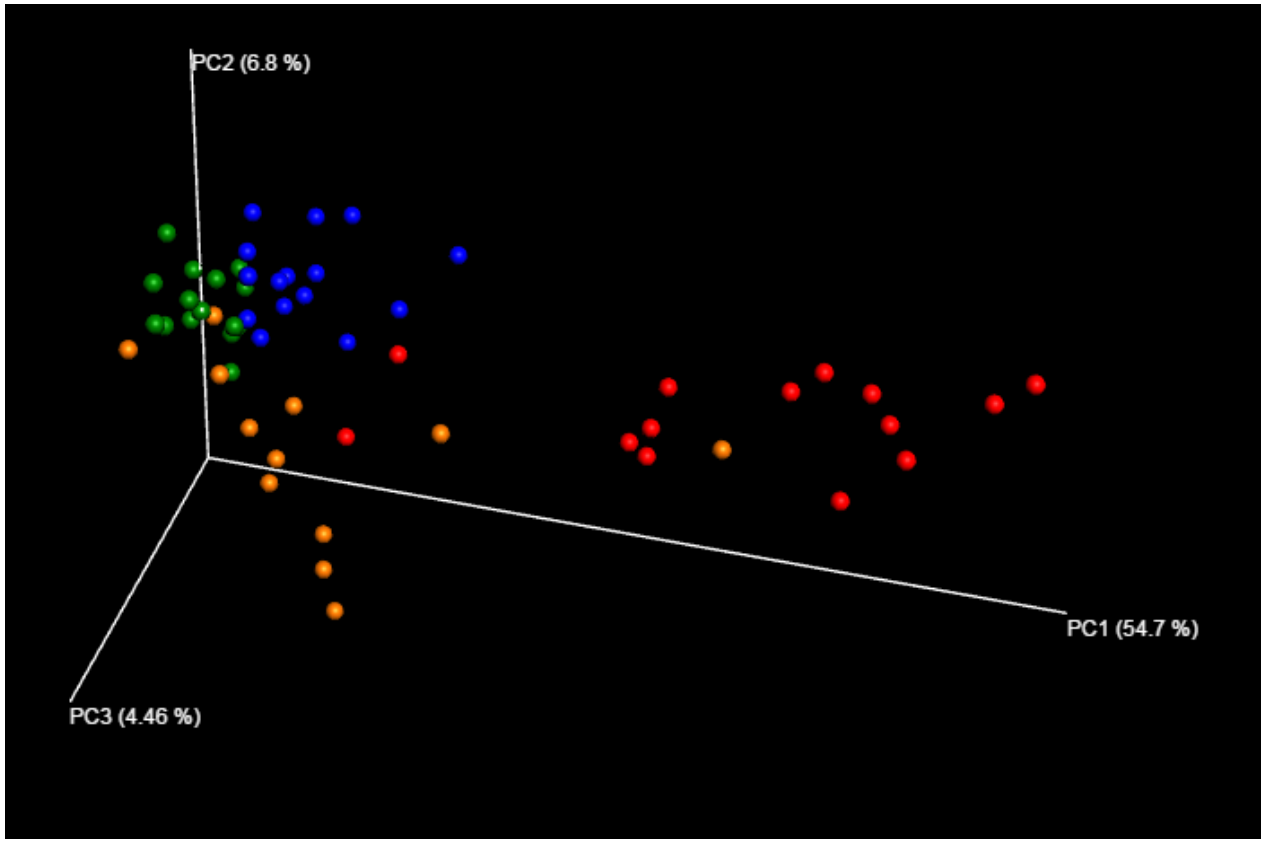


RELATION BETWEEN RFI AND NDF & RFI AND A:P RATIO

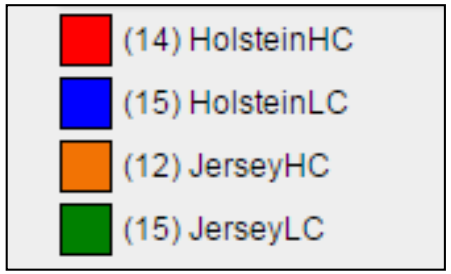




RUMEN MICROBIAL COMMUNITY – GROUPED ACCORDING TO BREED AND DIET



Diet: P = 0.001
Breed: P = 0.001
RFI: P = 0.72



CONCLUSION

Q: Do Holstein and Jersey differ in methane production pr kg DMI og ECM?

A: Jerseys have higher methane per kg DMI than Holsteins, but not per kg ECM

Q: Do they respond similar to a given well known methane reducing feeding strategy?

A: Holsteins seems to respond much more than Jerseys pr kg DMI but not pr kg ECM

Q:What is the relationship between RFI and methane?

A: For Holsteins efficient animals seem to have a higher NDF digestibility, A:P ratio, and methane production than inefficient animals. For Jerseys the picture is less clear.

Thank you for your attention!

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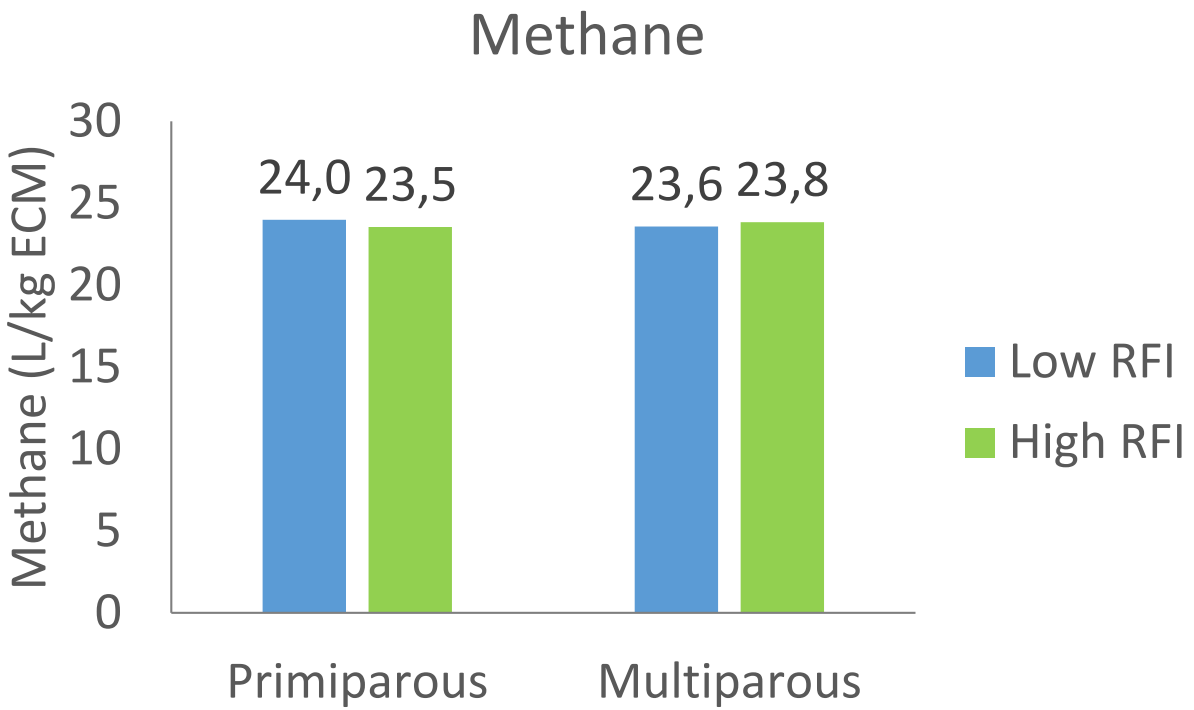
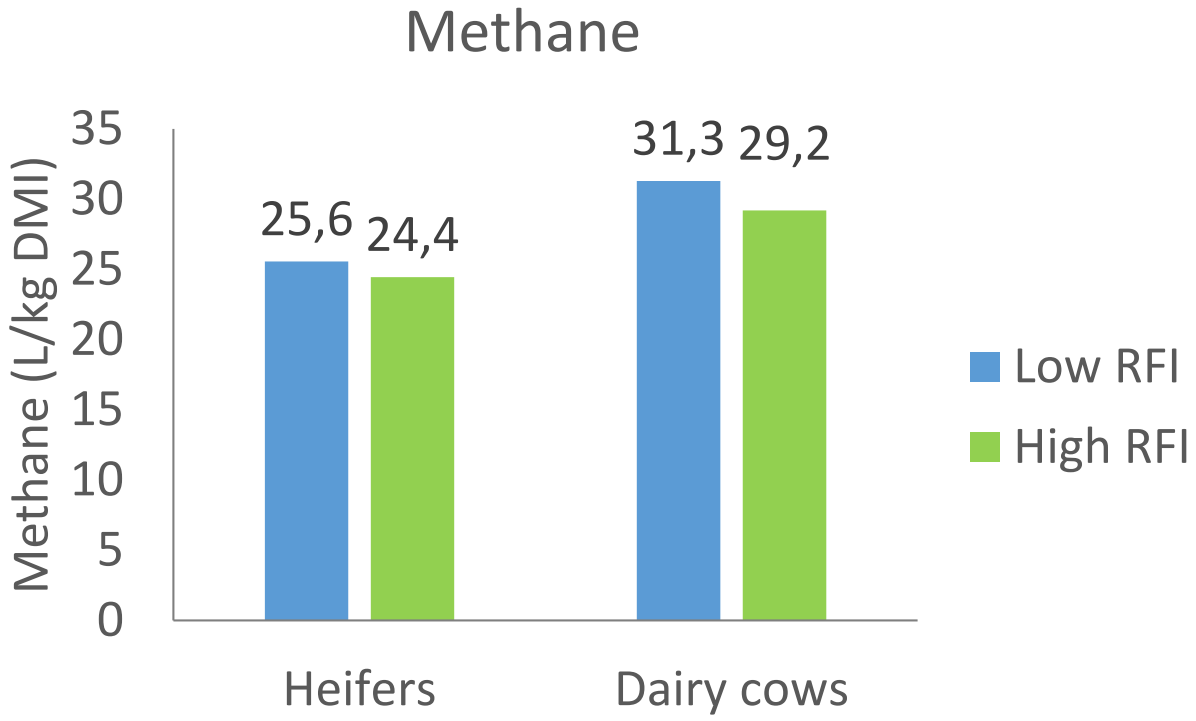
RELATION BETWEEN RFI AND METHANE PER KG ECM – LITERATURE

Our data (Olijhoek et al., in press)

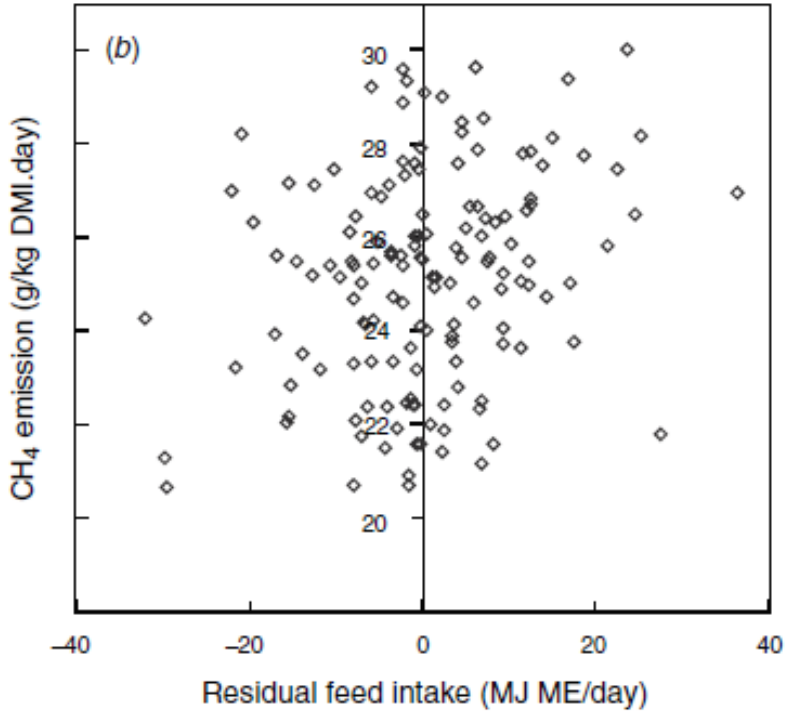


Marett et al. (2017)

RELATION BETWEEN RFI AND METHANE PER KG DMI – ONLY AVAILABLE DATA IN LITERATURE



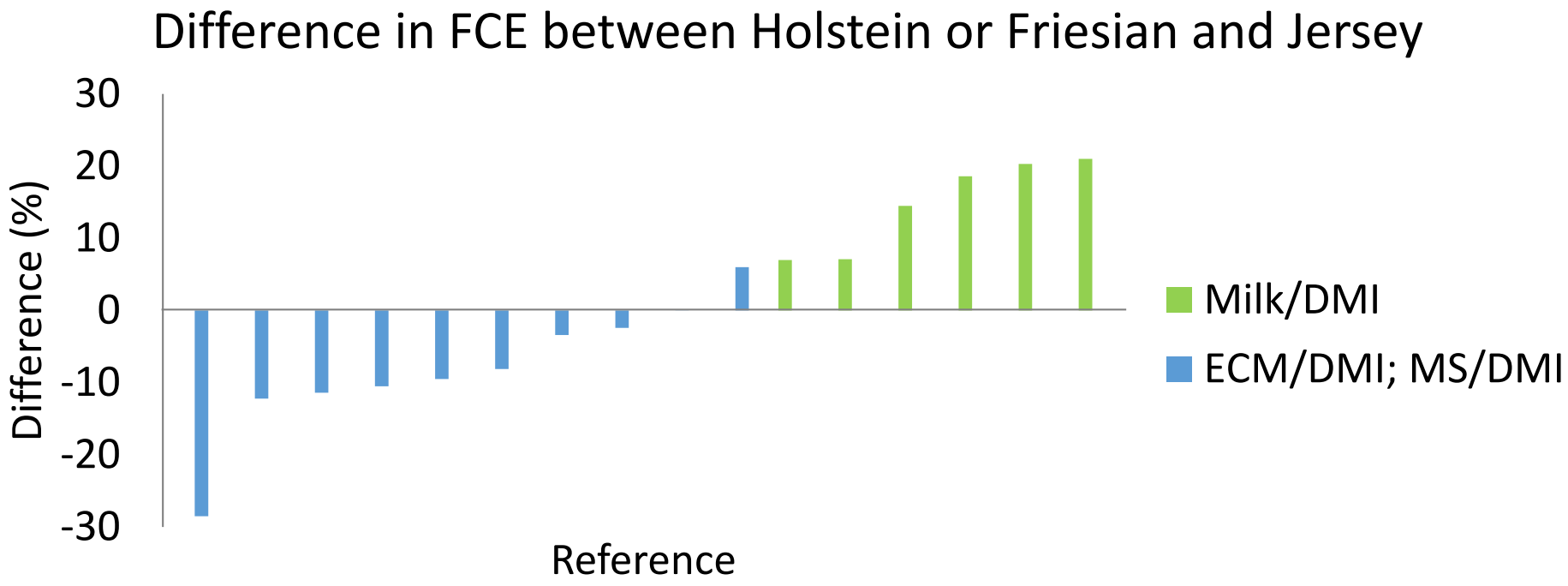
Waghorn and Hegarty (2011) P = NS



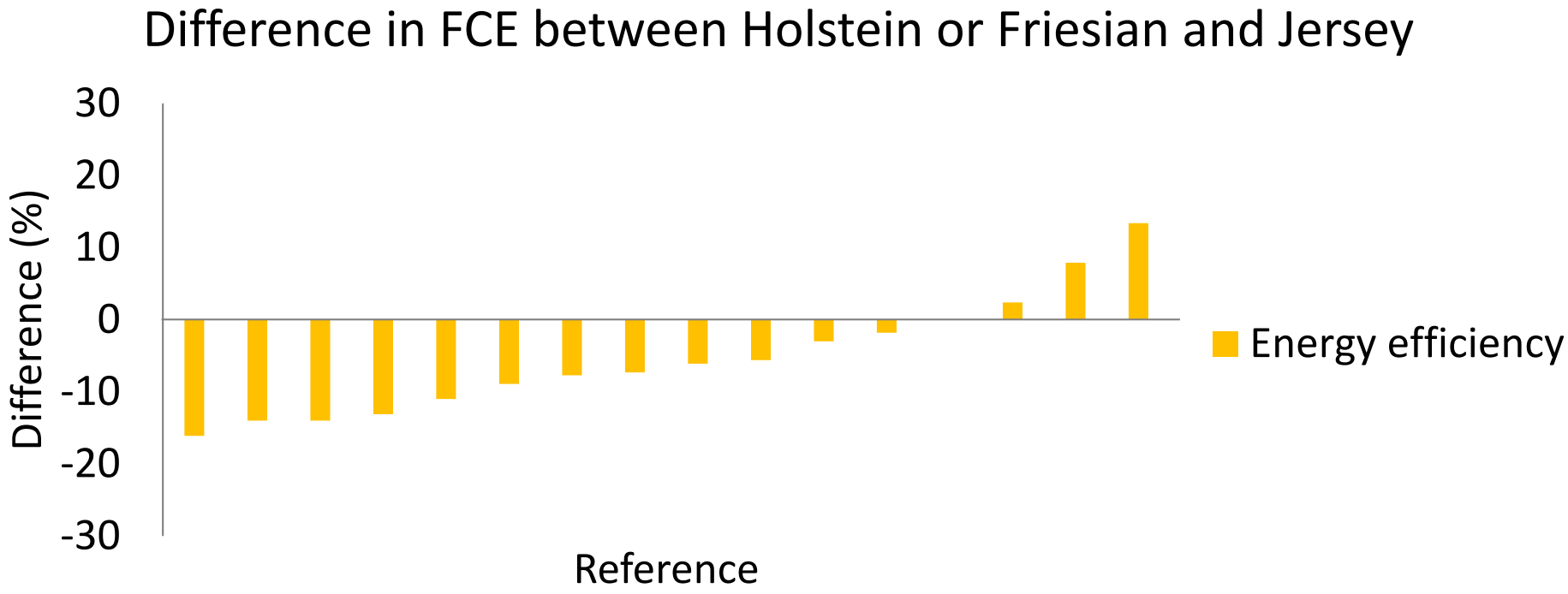
Münger and Kreuzer (2008) r = 0.26

DELETED SLIDES

FEED CONVERSION EFFICIENCY OF BREEDS

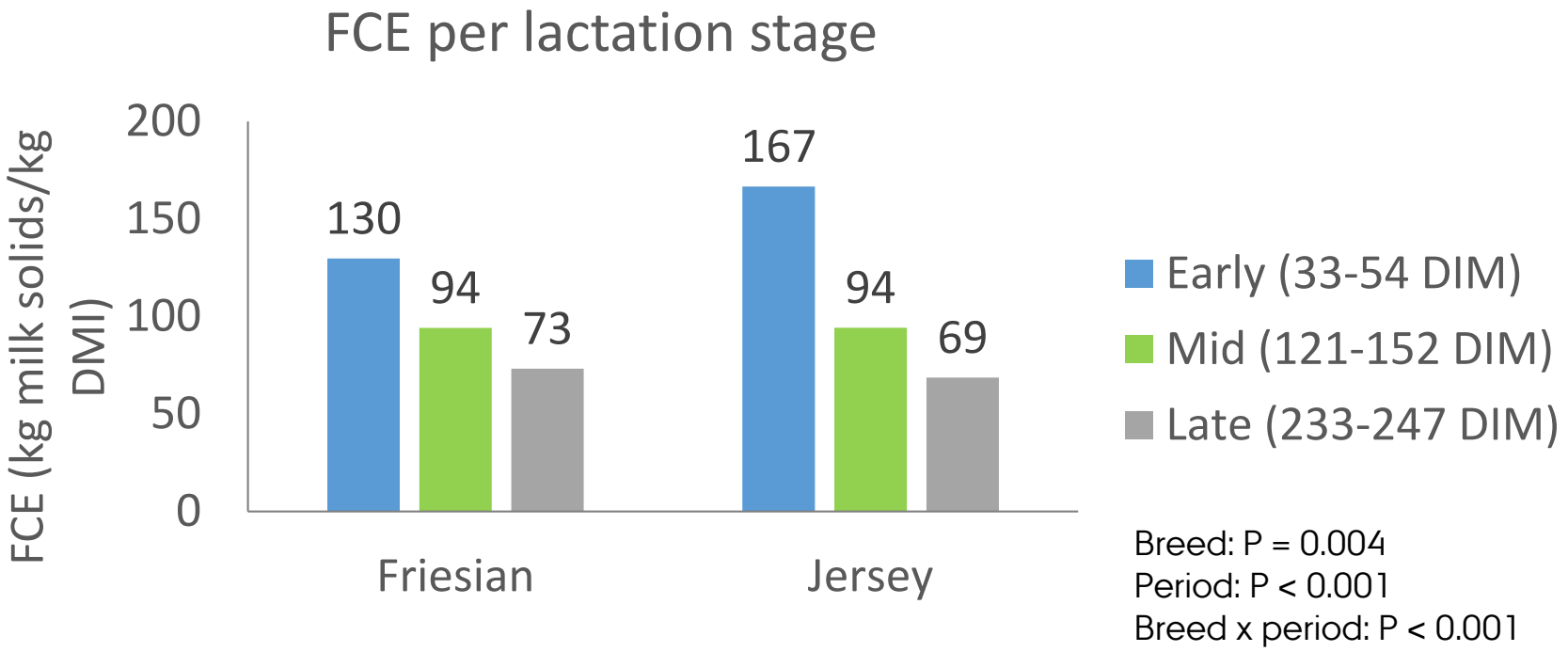


FEED CONVERSION EFFICIENCY OF BREEDS



Problem: does not take body reserves into account

STAGE OF LACTATION IS IMPORTANT

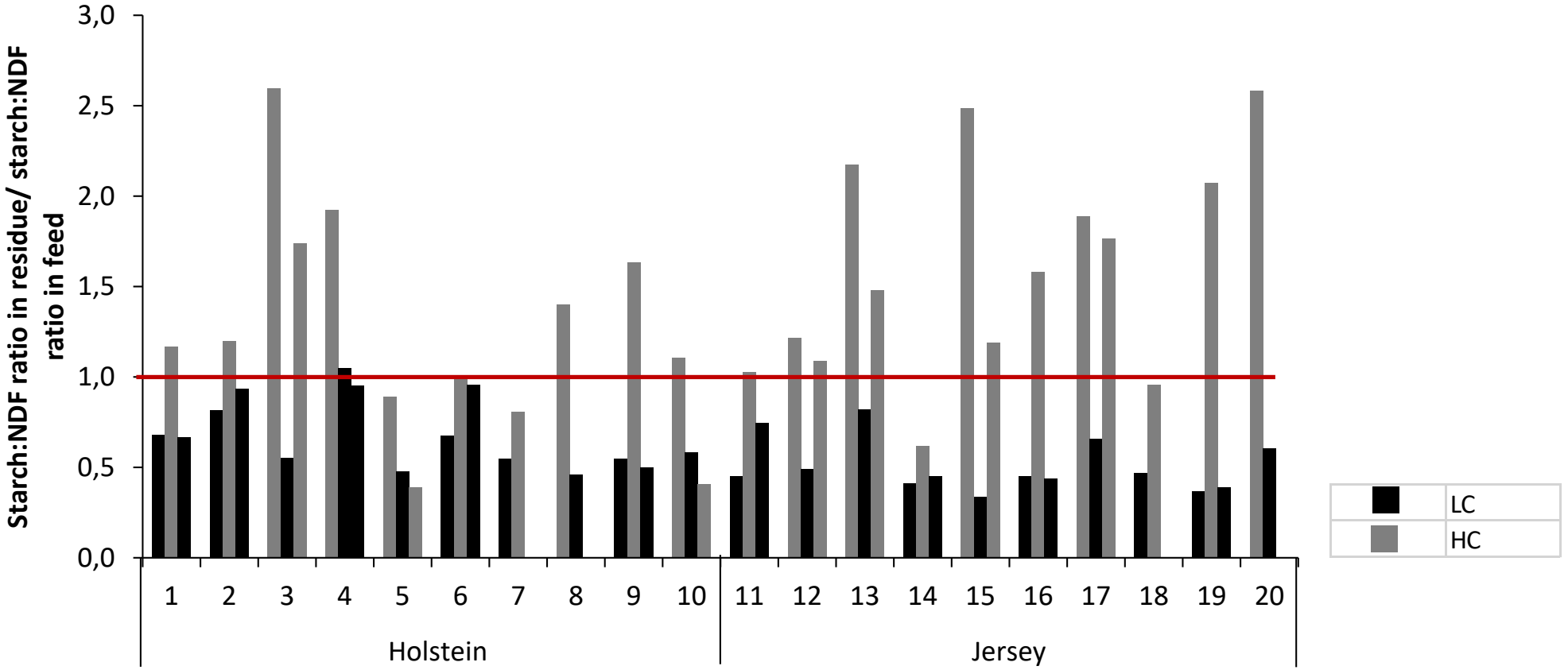


Breed: P = 0.004
Period: P < 0.001
Breed x period: P < 0.001

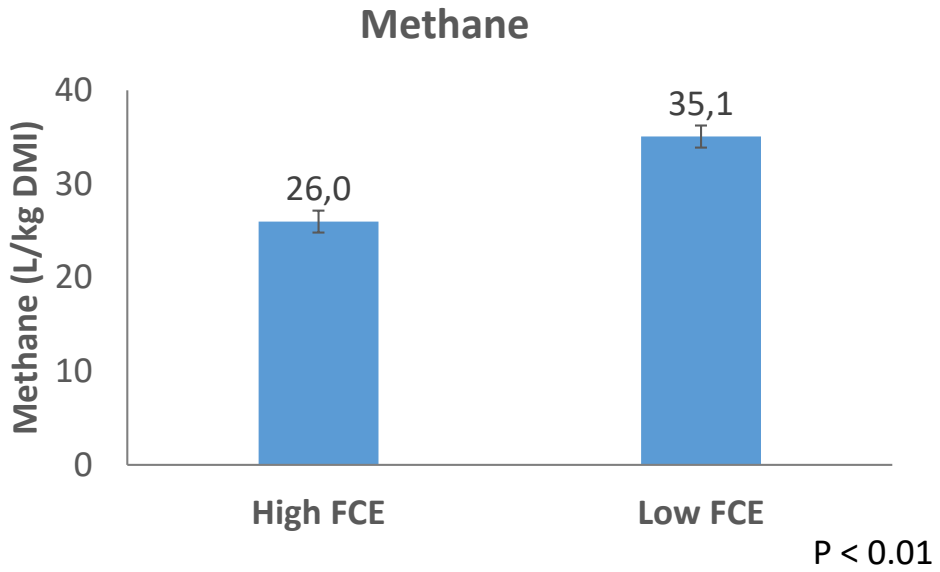
Thomson et al. (2001)

ADDITIONAL SLIDES

FEED SORTING

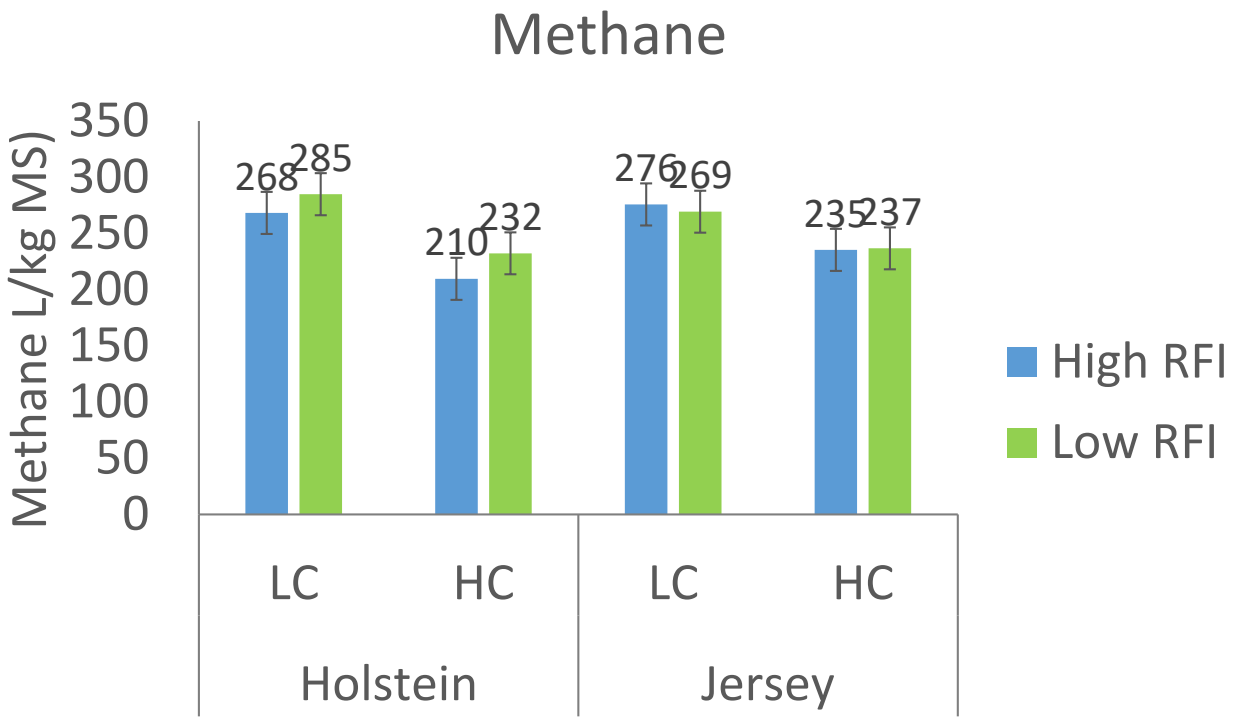


RELATION FCE AND METHANE

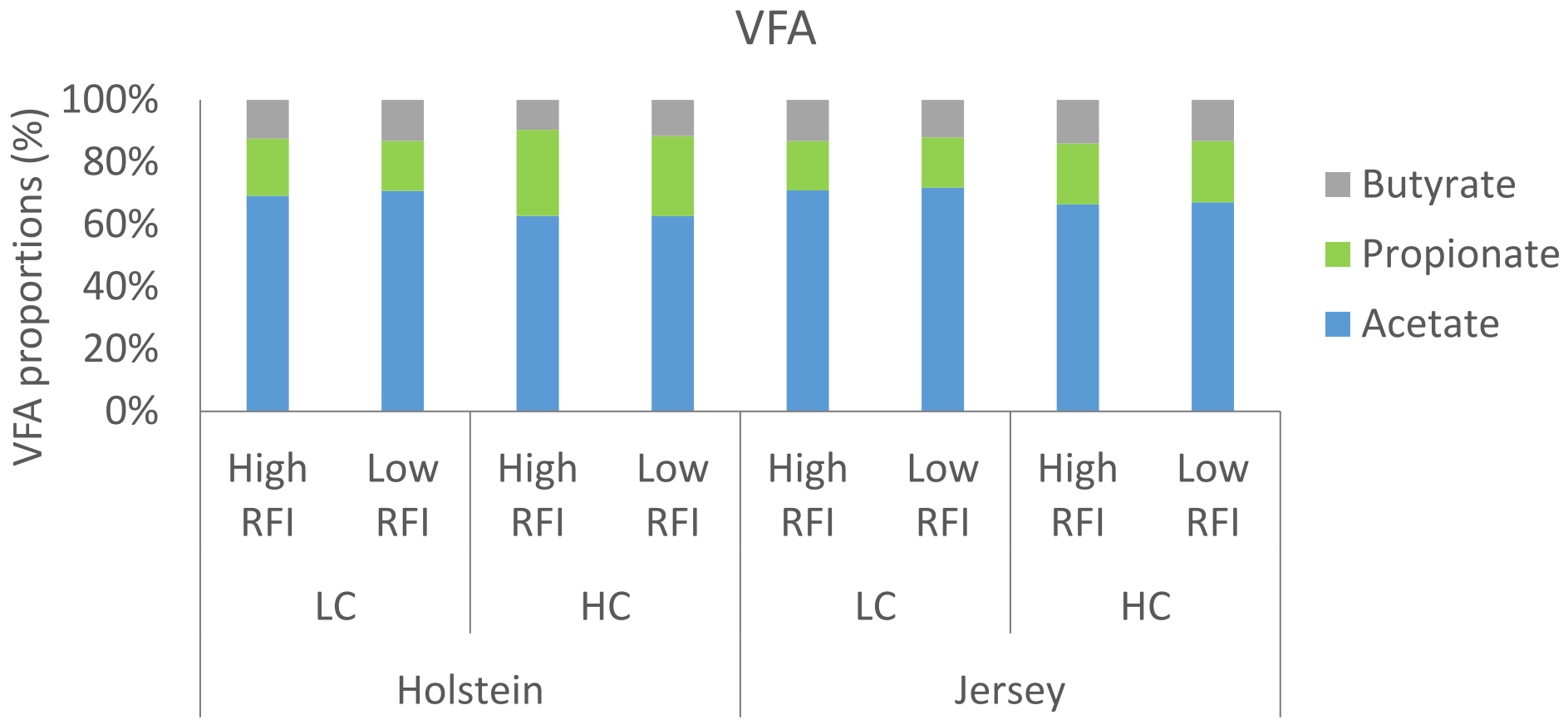


Arndt et al. (2015)

METHANE PER KG MILK SOLIDS



VFA PROPORTIONS



NO CORRELATION BETWEEN RFI AND FCE