



Effects of high fibre on gas production and net energy in diets fed to group-housed pigs



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One of the most expensive
components in diets for pigs

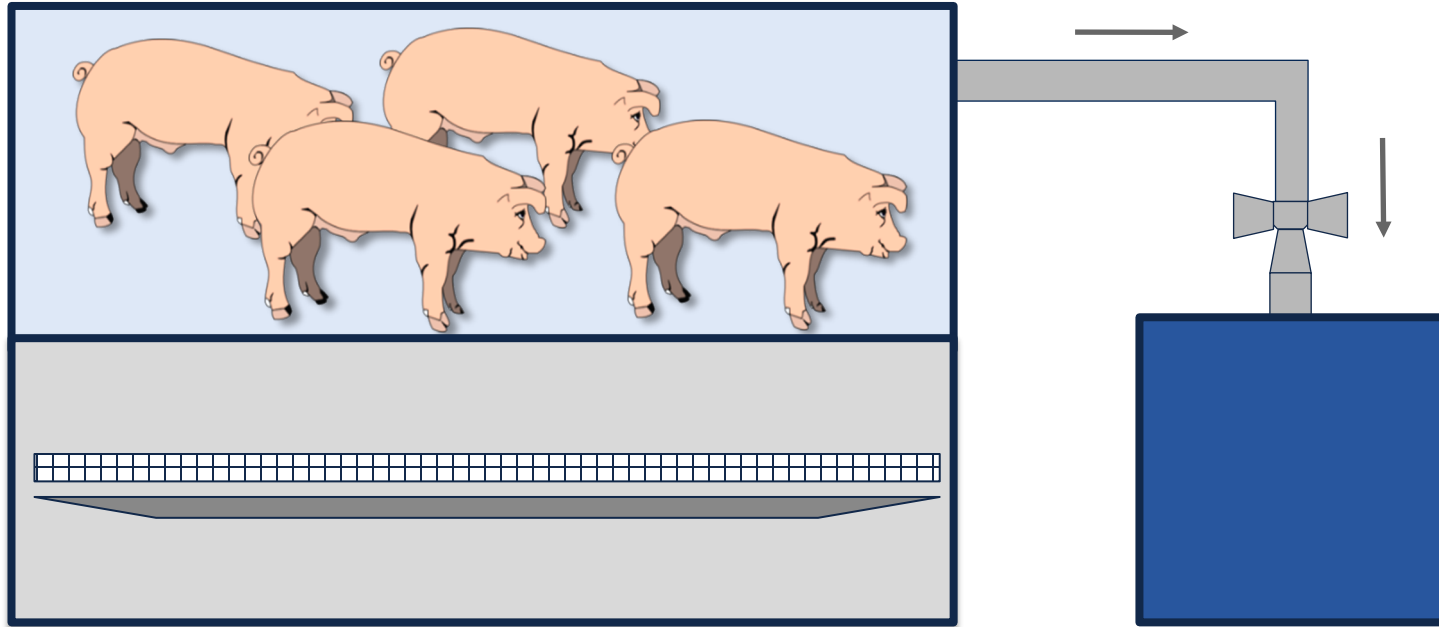
*Determination of [energy]
in feed ingredients*

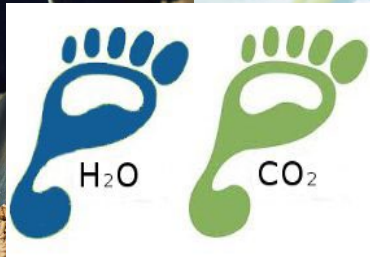
Indirect calorimeter (group-housing)



(University of Illinois)

Indirect calorimeter at Univ. IL





Sustainability?



Objective

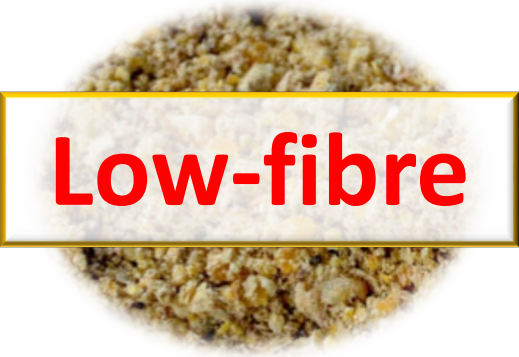
ATTD, Retention, and NE

Gas consumption & production



Diet containing fibrous feed ingredient

Experimental diets



Low-fibre

Corn-SBM

33% wheat middlings (WM)



High-fibre

Corn-SBM + WM



Photo by Molly McGhee

Animals & Exp. design

24 pigs (4 pigs/chamber)

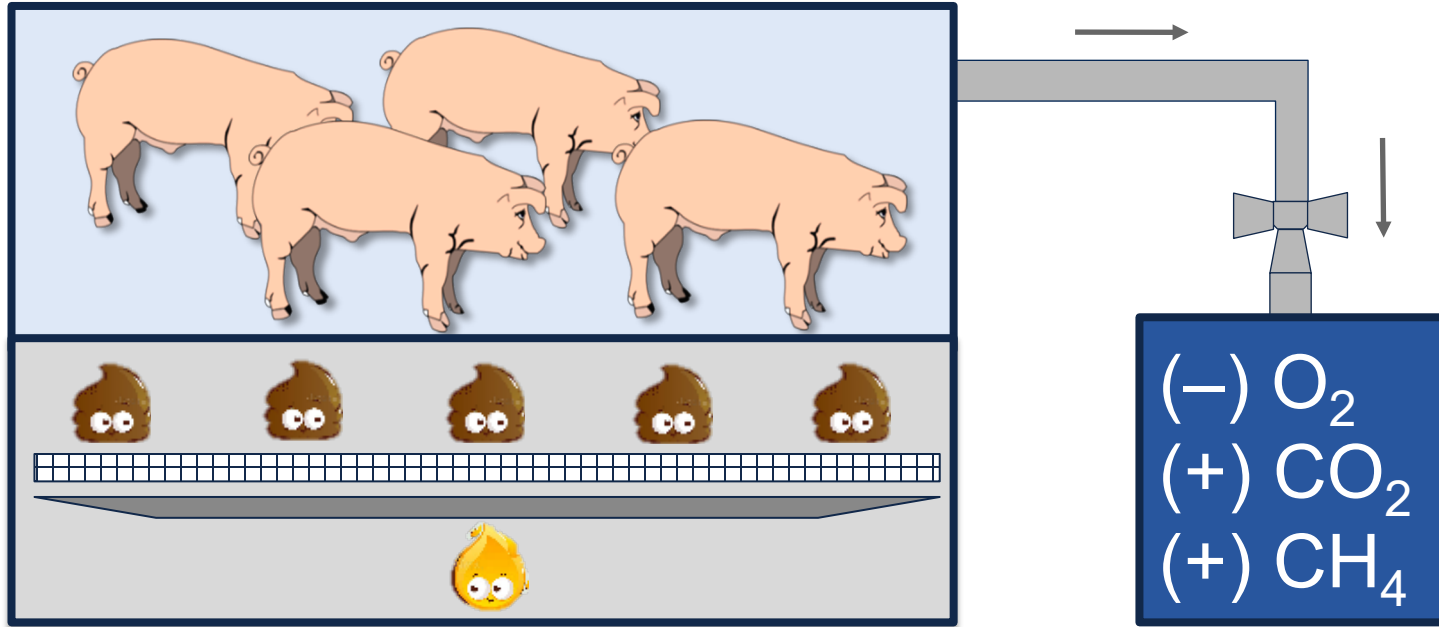
(BW: 40.9 kg; SD = 1.7)

A triplicated 2×2

**(6 chambers, 2 trt, 2 periods;
6 rep/trt)**

Sample collection

7 d adaptation, 6 d collection, 48 h fasting



Chemical analyses

Feces: DM, GE, and N

Urine: GE and N



Calculations

- ATTD of DM, GE, and N
- Retention of N
- DE, ME, and NE
- O₂ consumption and CO₂ and CH₄ production



Photo by Molly McGhee

Calculation

1. Calculation of THP and FHP (Brouwer, 1985)

- O_2 consumption
- CO_2 and CH_4 production
- Urine N



Photo by Molly McGhee

Calculation

1. Calculation of THP and FHP (Brouwer, 1985)

- O₂ consumption
- CO₂ and CH₄ production
- Urine N

2. Calculation of net energy

$$\text{NE} = \text{GE} - \text{fecal energy} - \text{urine energy} \\ - \text{THP} + \text{FHP}$$

Statistical analysis

Mixed Proc. (SAS)

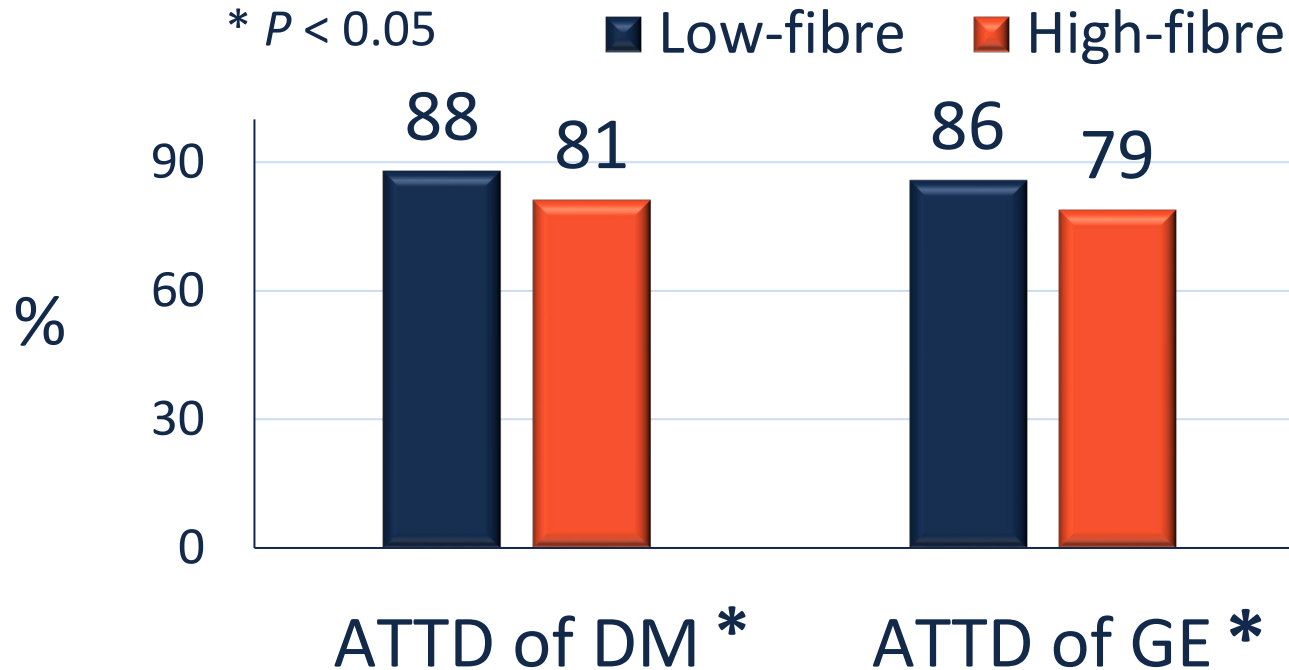
Model: diet (fixed)

period and chamber (random)

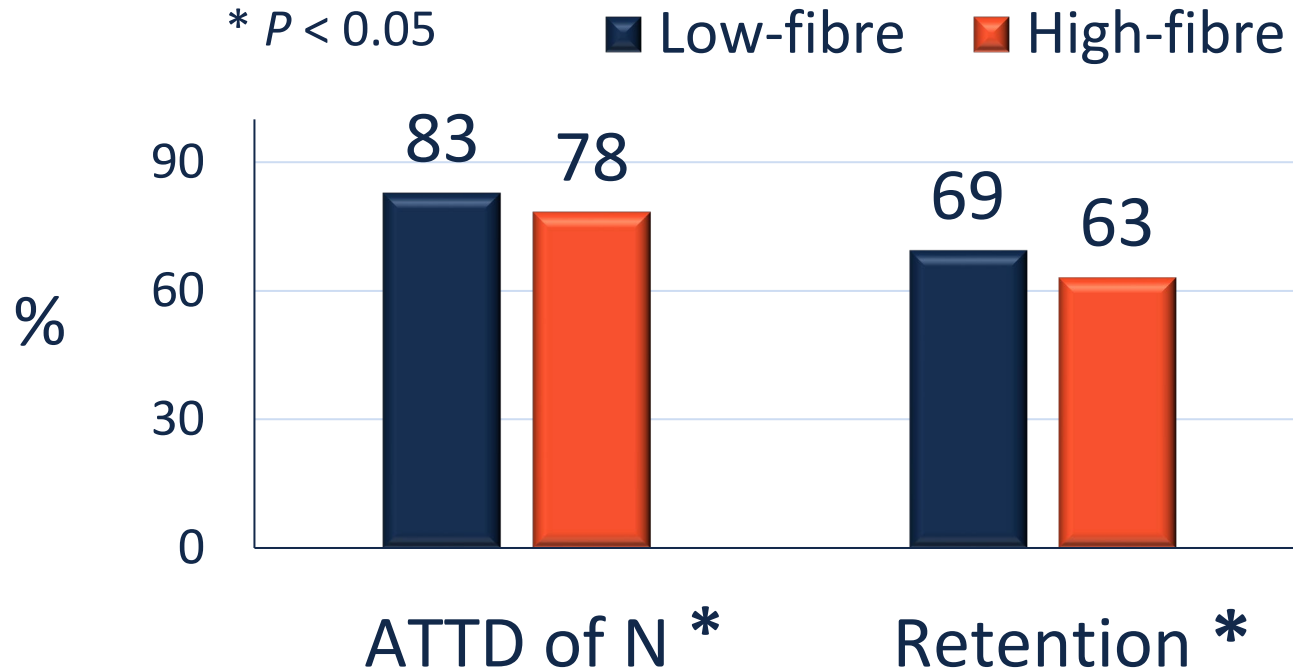
Significance: $\alpha < 0.05$ (tendency ≤ 0.10)



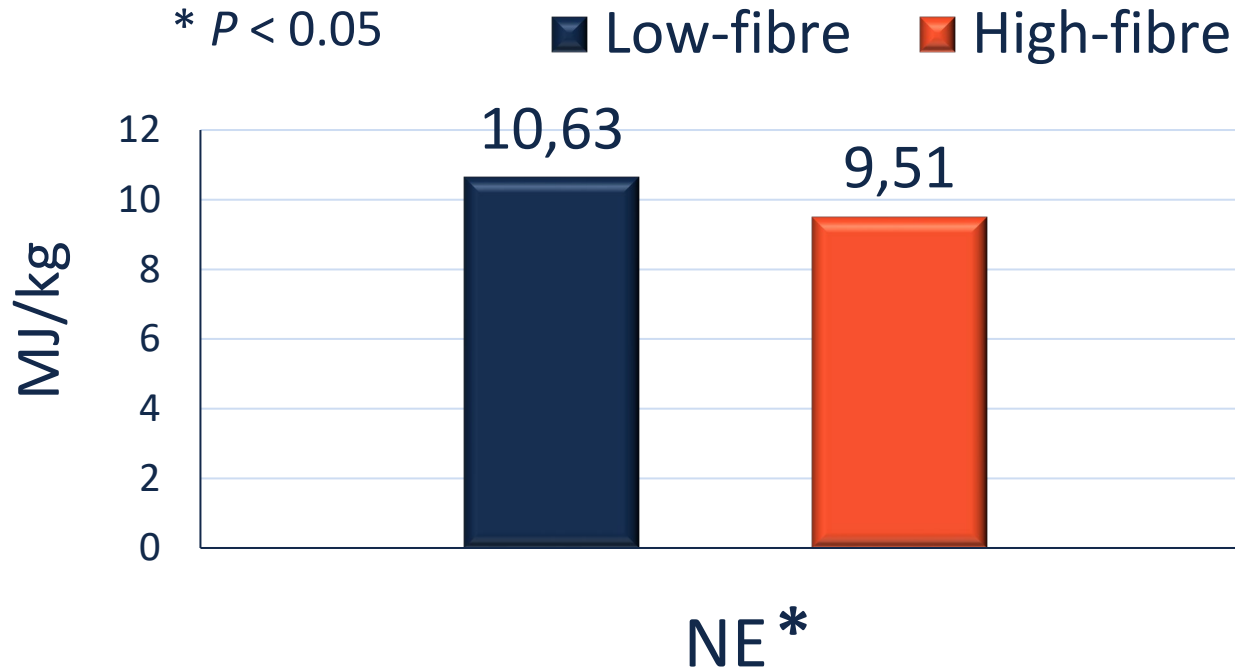
ATTD of DM and GE in diets



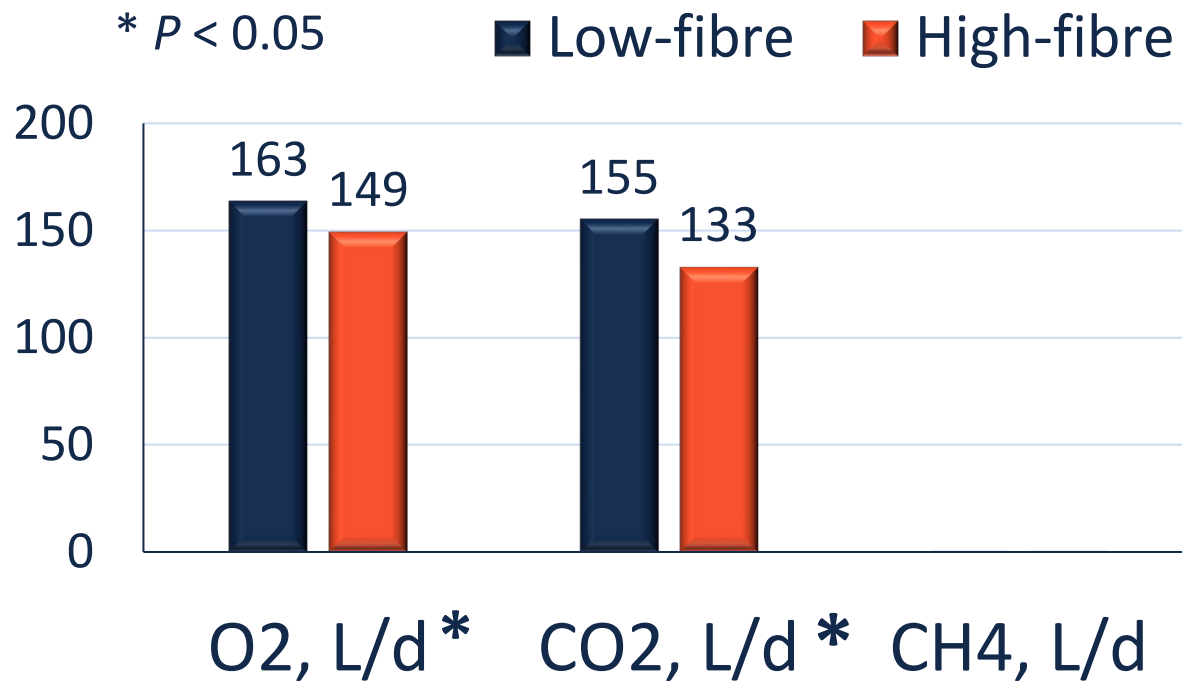
ATTD of N and retention (% intake)



Net energy in diets

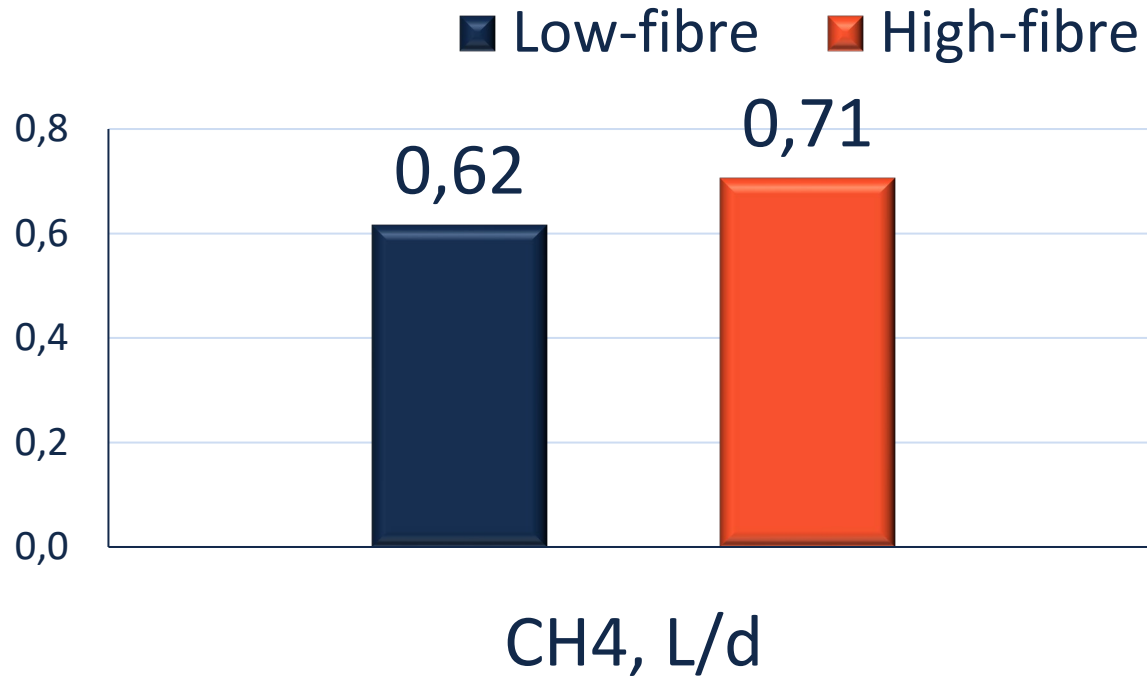


Gas consumption and productions



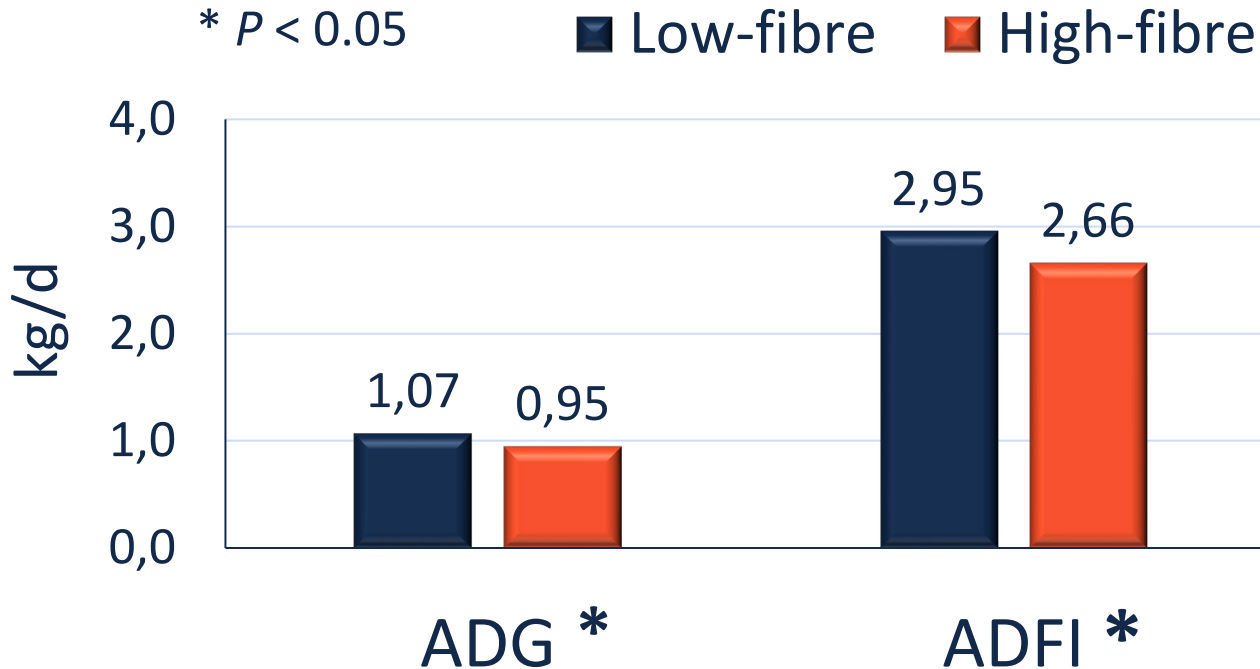
Per one pig

CH₄ production



Per one pig

Weight gain and feed intake



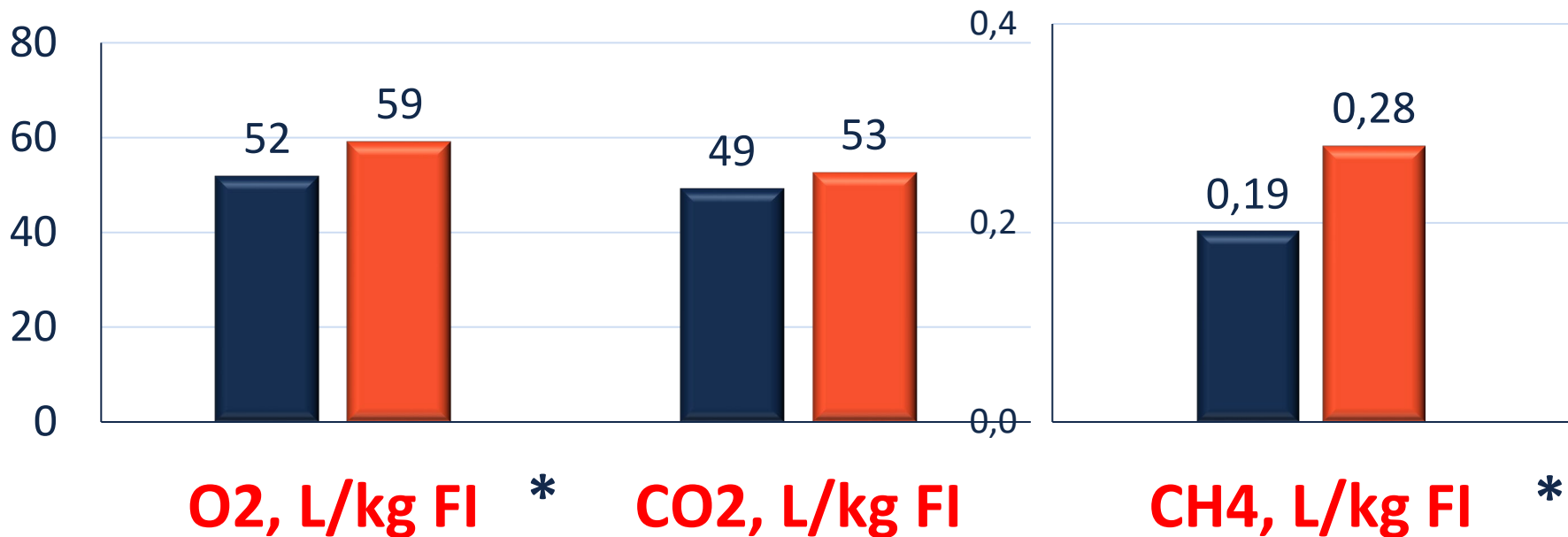
Per one pig

Gas consumption and productions (FI correction)

* $P < 0.05$

■ Low-fibre

■ High-fibre

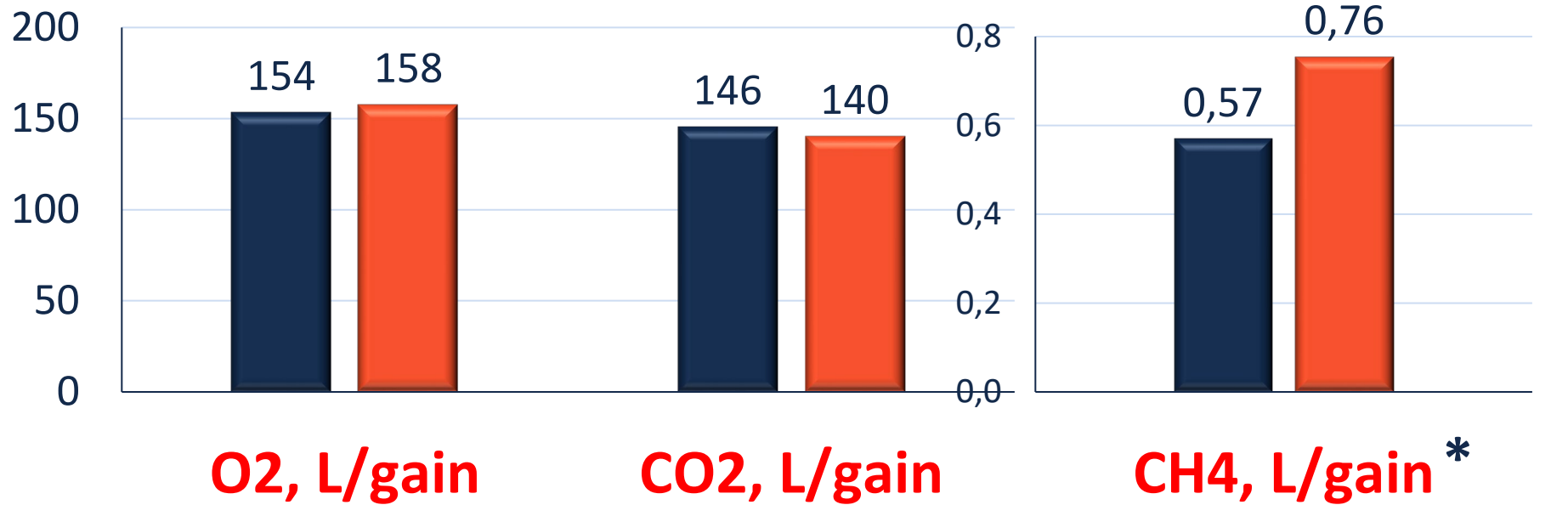


Per one pig

Gas consumption and productions (Wt. gain correction)

* $P < 0.05$

■ Low-fibre ■ High-fibre



Per one pig

Conclusions



↑ Fiber (wheat middlings) →
↓ ATTD of DM, GE, and N, retention of N, and NE



↑ Fiber (wheat middlings) →
↓ Gas consumption and production



When corrected with FI and weight gain,
↑ Fiber → ↑ O_2 consumption and CH_4 production

Thank you



I HANS H. STEIN
MONOGASTRIC
NUTRITION 
LABORATORY

