Effect of feeding strategies on methane emissions of dairy cows evaluated by MIR spectrometry

Lessire F., Scohier C.,

Prévot A., Soyeurt H., Dufrasne I.

ULg –Belgium

Material and Methods

Trials set up at the Experimental Farm of Ulg - Belgium

Winter 2015 - 2016

- ✓ Herd of 54 Holstein dairy cows
- ✓ Average Milk yield: 24,7 kg.cow^{-1}.day^{-1}
- ✓ DIM: 176 days
- ✓ Automatic milking system

=>Data available on a daily - individual basis:

MY – concentrate consumption - weight

- ✓ Estimation of methane emissions: by MIR milk spectra analysis

Material and Methods

Trials set up at the Experimental Farm of Ulg - Belgium

Winter 2015 - 2016

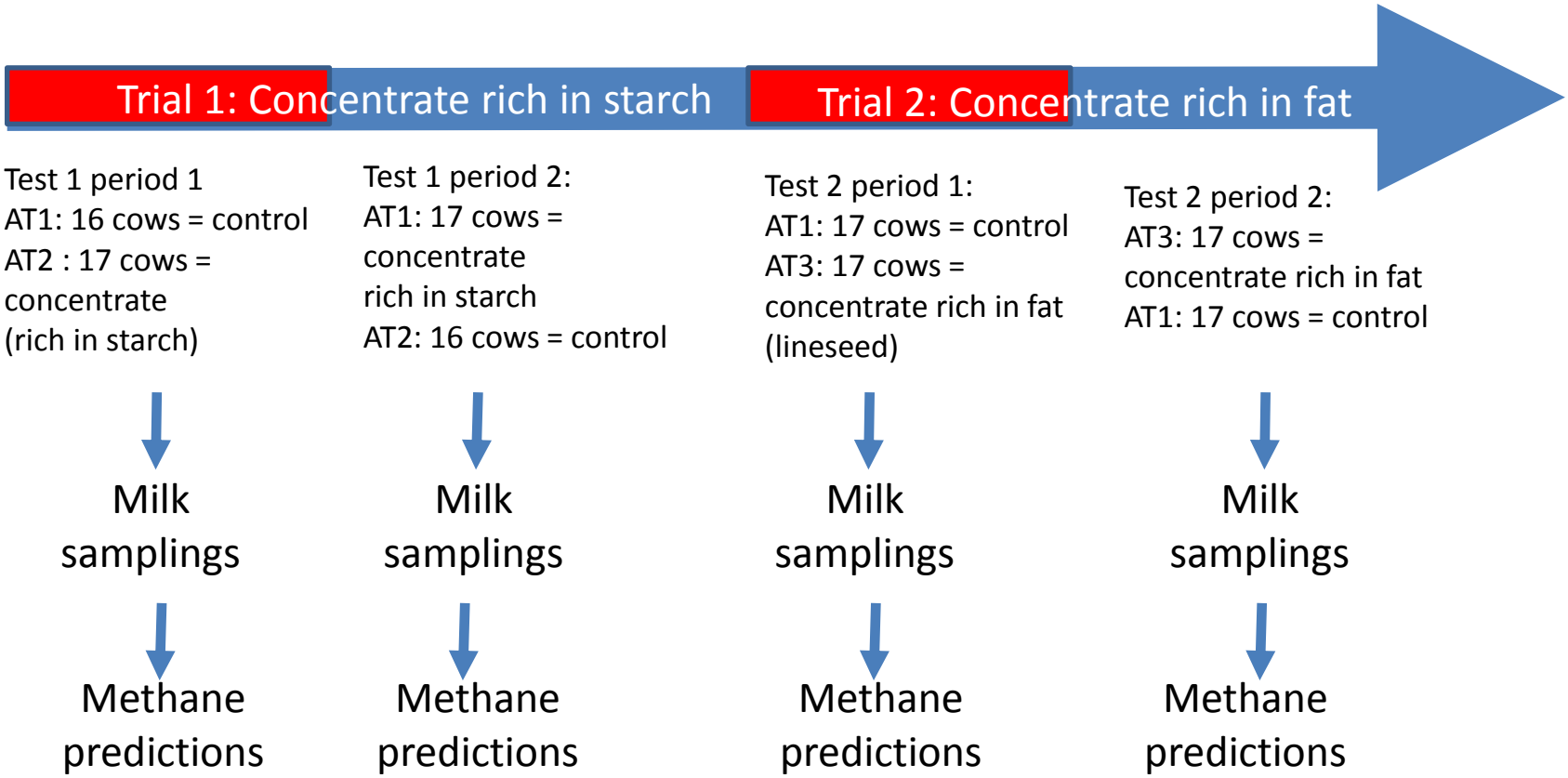
- ✓ TMR given to the cows

Completed by concentrate

of variable composition

- ✓ 2 compositions tested:
  - Rich in starch (32%) vs control
  - Rich in fat (9%) vs control
- ✓ Test period = 1 month
  - 15 d: adaptation - stabilisation
  - 15 d: measurements

Experimental design 2015-2016



Determination of milk spectra

Methane predictions following the equation developed by Vanlierde et al., 2015

Experimental design 2015-2016

Description of the groups

	Trial 1*: Concentrate rich in starch		Trial 2*: Concentrate rich in fat	
	AT1	AT2	AT1	AT3
Nbr cows	16	17	17	17
DIM	119 ± 108	116 ± 124	97 ± 79	83 ± 54
LN	2,5 ± 1,6	3,0 ± 1,8	2,6 ± 1,7	3,1 ± 1,8
MY ($kg.cow^{-1}.day^{-1}$)	22,7 ± 7,0	22,9 ± 9,4	31,1 ± 6,9	33,2 ± 7,0
Concentrate ($kg.cow^{-1}.day^{-1}$)	3,4 ± 1,8	3,4 ± 1,8	5,3 ± 1,7	5,1 ± 1,7

*Values at the beginning of the trial

Results

	Trial 1*: Concentrate rich in starch		Statistical significance		
	AT1	AT2	Group	Test	DIM
MY ($kg.cow^{-1}.day^{-1}$)	28,2 ± 1,3	24,4 ± 1,3	*	ns	ns
ECM ($kg.cow^{-1}.day^{-1}$)	26,5 ± 1,3	23,3 ± 1,3	trend	ns	ns
Methane ($g.cow^{-1}.day^{-1}$)	427 ± 9	425 ± 10	ns	*	**
Methane ($g^{-}.kg\ milk^{-1}$)	17,2 ± 0,7	19,5 ± 0,7	*	ns	***
Methane ($g.kg\ ECM^{-1}$)	17,5 ± 0,7	20,3 ± 0,7	*	ns	***

*Values: Lsmeans ± SE – proc mixed SAS 9.3

Results

	Trial 2*: Concentrate rich in fat		Statistical significance		
	AT1	AT3	Group	Test	DIM
MY ($kg.cow^{-1}.day^{-1}$)	28,1 ± 1,3	31,0 ± 1,4	trend	ns	ns
ECM ($kg.cow^{-1}.day^{-1}$)	27,6 ± 1,3	29,8 ± 1,4	ns	ns	ns
Methane ($g.cow^{-1}.day^{-1}$)	461 ± 7	459 ± 7	ns	ns	*
Methane ($g.kg\ milk^{-1}$)	17,4 ± 0,8	15,9 ± 0,8	ns	ns	ns
Methane ($g.kg\ ECM^{-1}$)	17,8 ± 0,8	16,6 ± 0,9	ns	ns	ns

*Values: LSmeans ± SE – proc mixed SAS 9.3

Results –Conclusions

- No statistically significant decrease in methane emissions
- Methane g/kg milk – Methane g/kg ECM: numerical decrease by 8,6% - 6,7% for trial 2 (concentrate rich in fat)

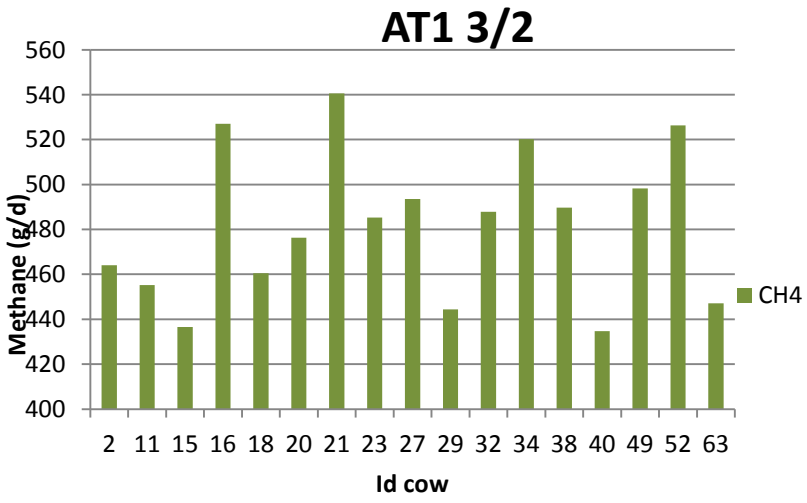
Is it possible that the differences were masked ?

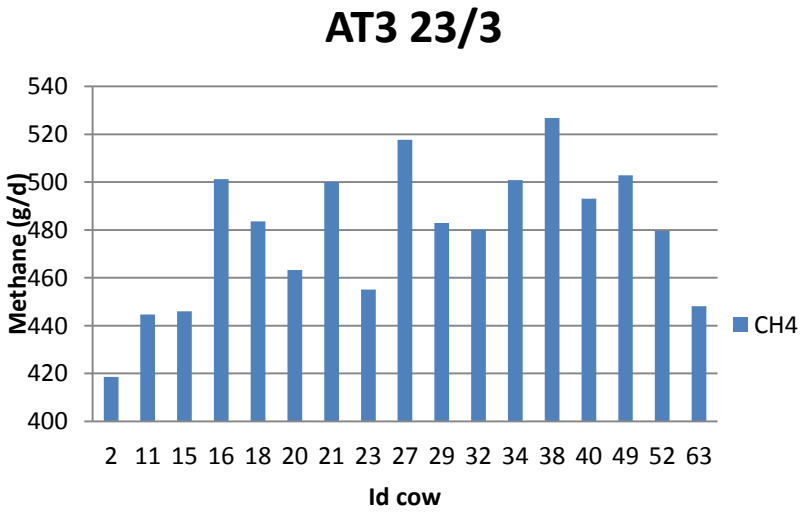
- Impact of inter-individual difference
- Impact of standard error of calibration/cross validation?
- Amount of concentrates provided – ration based on roughages?

=> Need for further investigation!

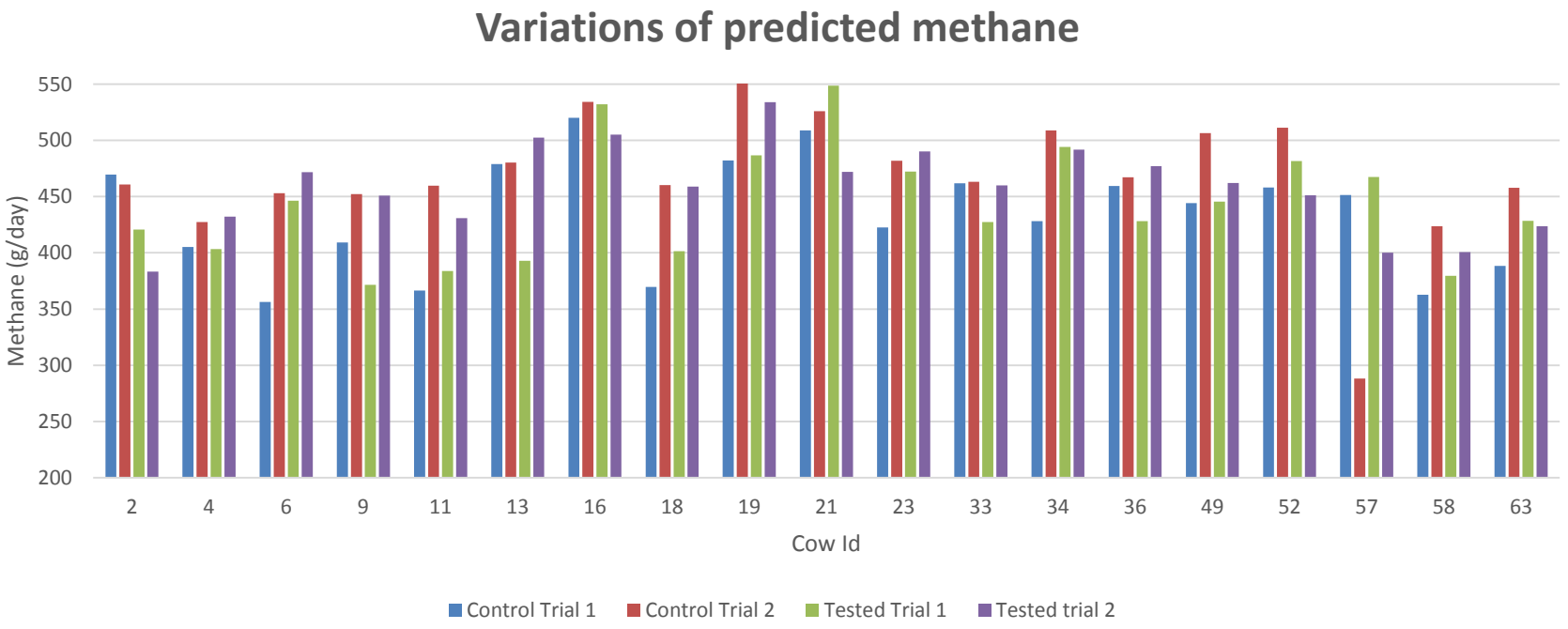
Inter-individual variations?

Example sampling of 23/3 – after cross-over





Inter-individual variations?



Thank you for your attention

Thanks to Amélie Vanlierde – Frédéric Dehareng