DairyBio

Economic Development, Jobs, Transport and Resources

Genetic parameters for environmental traits in Australian dairy cattle

Caeli Richardson
PhD Candidate

LA TROBE UNIVERSITY

AGRICULTURE VICTORIA

DFC PLC ✓
@dfc_plc

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Real milk comes from real cows. Anything else is nuts. #BuyCanadian

Troll101 @troll101 · 2h

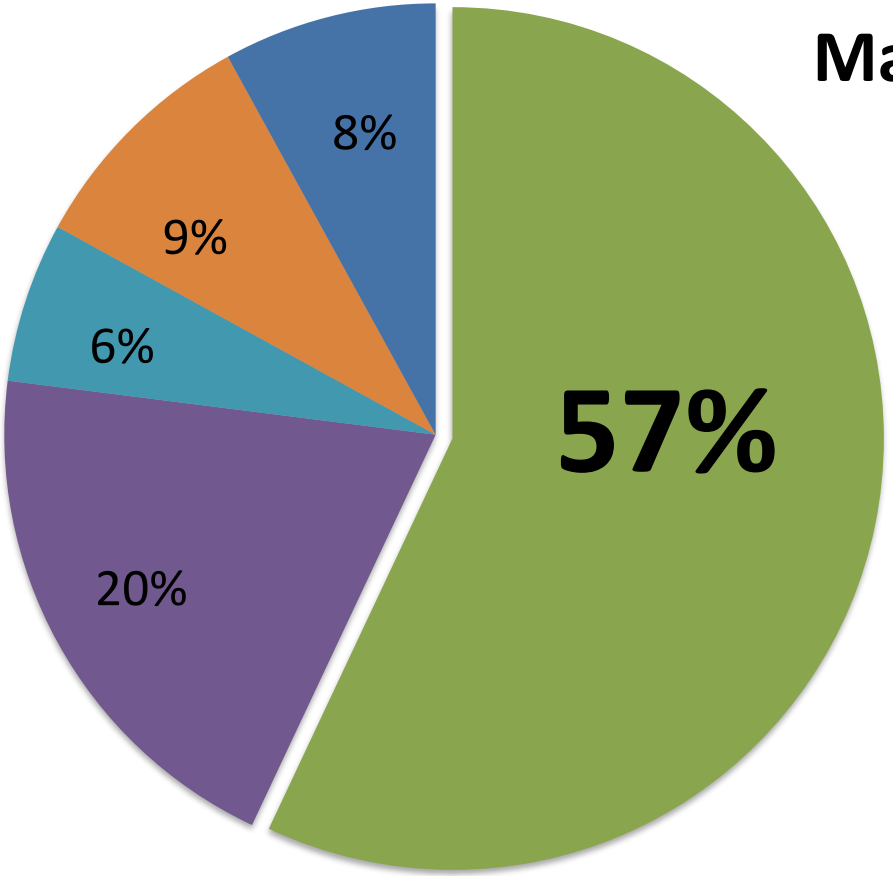
Replying to @dfc_plc

[redacted] You are the biggest source of greenhouse gas. Shut it down, ban milk! Boycott milk, Que. MILK

Learn more about #CanadianDairy

www.dairyfarmersofcanada.ca

Here are the facts!



Major Sources of GHG emissions in Dairy Cattle

- **Enteric Methane**
- Manure & Urine
- Nitrogen Fertiliser
- Fuel & Electricity
- Purchased Feed

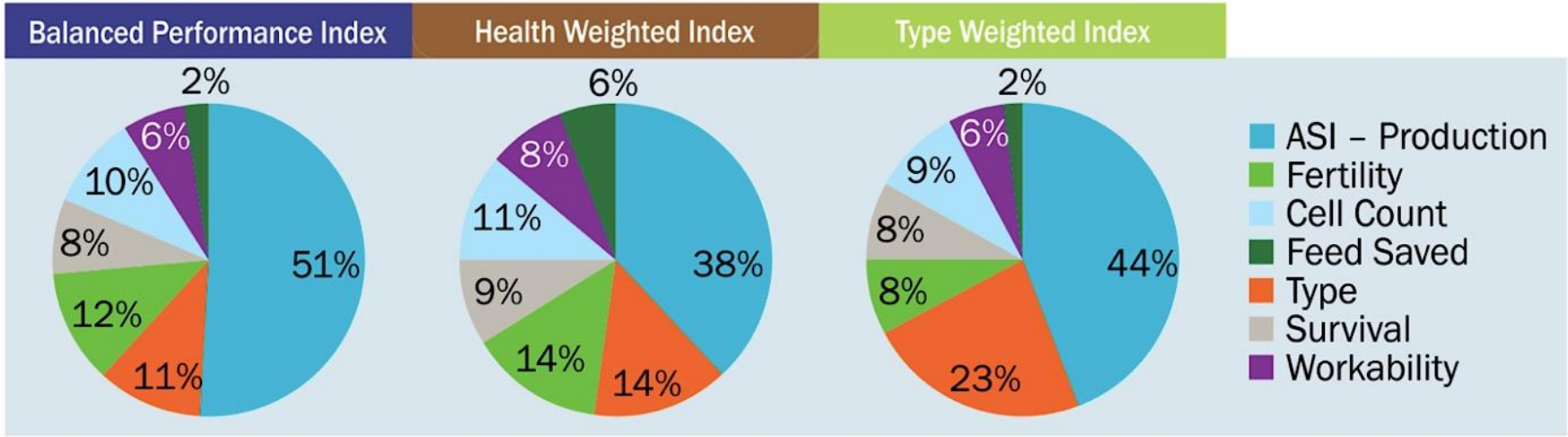
Australian Dairy

1.56 million dairy cows

- 273 cow herds (30 – 6000 cow herds)
- Seasonal calving (year-round and split)
- Holstein (other breeds including crossbred)
- 6070 kg 305d milk yield (3000 – 10 000 kg)
- Milking 2x/day (1x/day – 3x/day)
- Pasture with concentrate (5 feeding systems)

Breeding for Improved Efficiency

- Breeding value for methane is **NOT** available … anywhere!

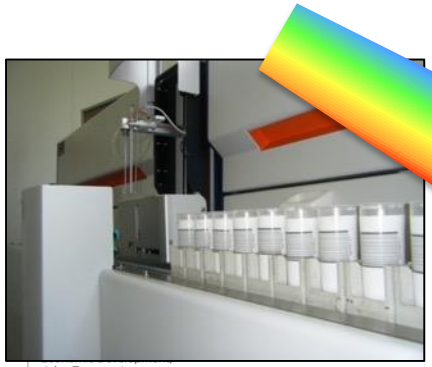


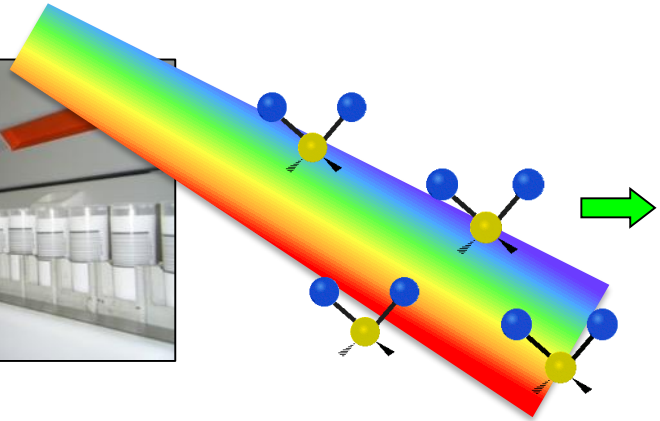
The Challenge of Measuring Methane

- Laborious
- Expensive
- Small datasets

… Unreliable breeding values

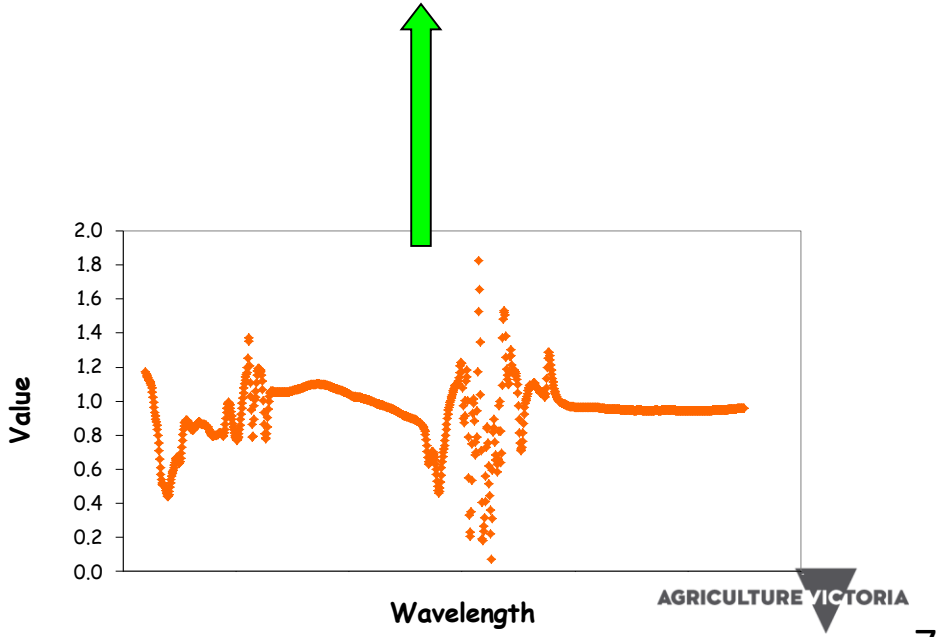
Mid-infrared (MIR) Technology





Jobs, Transport and Resources

Methane Production



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Get more out of herd milk testing

- Quick
- Inexpensive
- Readily available

- Routine genetic evaluation
  → Fat and protein
  → Methane?

Methane Production Phenotypes

Ellinbank Research Institute

- 331 cows
- SF_6 methane
- 5-day average

Australian Commercial Herds

- 4183 cows
- MIR predicted methane ($R^2cv = 0.3$)
- Closest to Ellinbank average DIM

Model

$$y_{ijkl} = \mu + YB_i + DIM_j + LN_k + g_l + e_{ijkl}$$

y_{ijkl} is the dependant phenotype of methane or MIR predicted methane
μ is the overall mean
YB_i is the year*batch interaction
DIM_j is the days in milk as a deviation from the mean
LN_k is the lactation number
g_l is the random additive genetic effect
e_{ijkl} is the random residual effect.

Preliminary Results

	Methane	MIR Predicted Methane	DMI
Methane			
MIR Predicted Methane			
DMI			

**** heritabilities are presented on the diagonal with genetic correlation above and phenotypic correlations below*

Preliminary Results

	Methane	MIR Predicted Methane	DMI
Methane	**0.11 (0.13)**		
MIR Predicted Methane			
DMI			

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Preliminary Results

	Methane	MIR Predicted Methane	DMI
Methane	**0.11 (0.13)**	0.97 (0.35)	
MIR Predicted Methane	0.24 (0.06)	**0.35 (0.03)**	
DMI			

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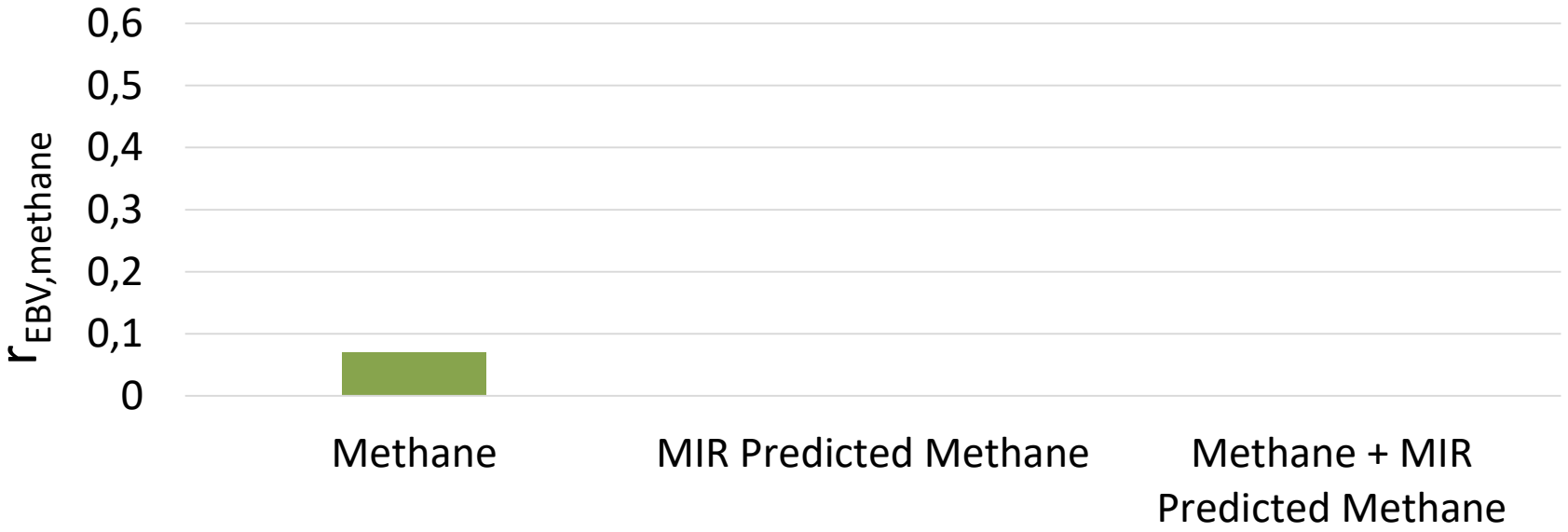
Preliminary Results

	Methane	MIR Predicted Methane	DMI
Methane	**0.11 (0.13)**	0.97 (0.35)	0.35 (0.31)
MIR Predicted Methane	0.24 (0.06)	**0.35 (0.03)**	0.30 (0.13)
DMI	0.48 (0.04)	0.18 (0.07)	**0.16 (0.14)**

**** heritabilities are presented on the diagonal with genetic correlation above and phenotypic correlations below*

Preliminary Results



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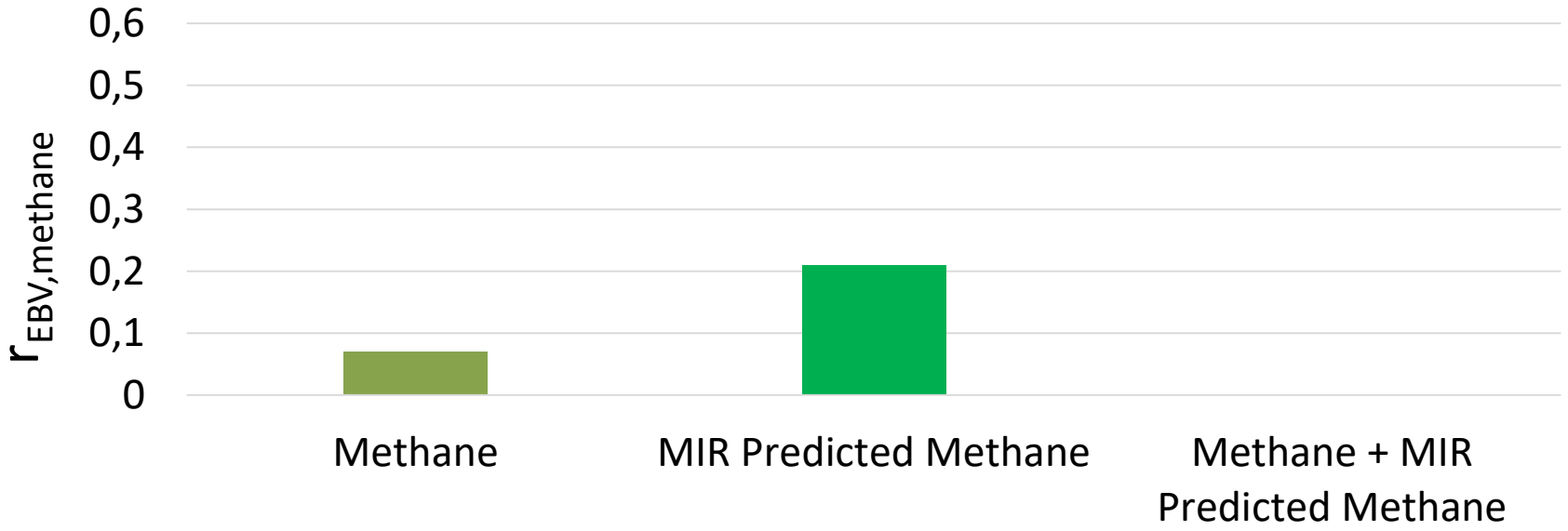

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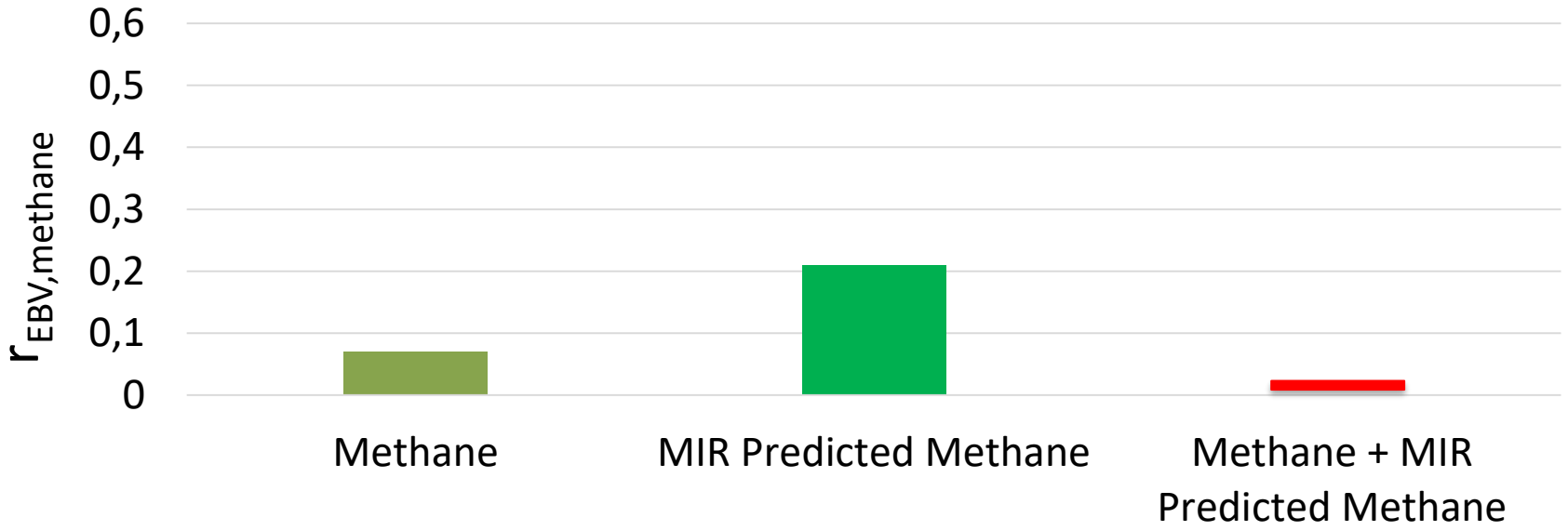

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h^2 = 0.11 (0.13)

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Reliable Breeding Values for Methane

... a work in progress

International collaboration

Methane: Sustainable and Economic

DFC PLC ✓
@dfc_plc

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Real milk comes from real cows. Anything else is nuts. #BuyCanadian

Troll101 @troll101 · 2h

Replying to @dfc_plc

Drinking milk is environmentally friendly. REDUCTION from 57% to 20%. Keep it going, buy milk! Support farmers, L-O-V-E. MILK.

Learn more about #CanadianDairy

www.dairyfarmersofcanada.ca

Acknowledgements

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Ellinbank Research Centre

Australian Dairy Farmers