

Reducing dairy herd methane emissions through improved health, fertility and management

Matt Bell^a, Eileen Wall^a, Graham Russell^b & Geoff Simm^a

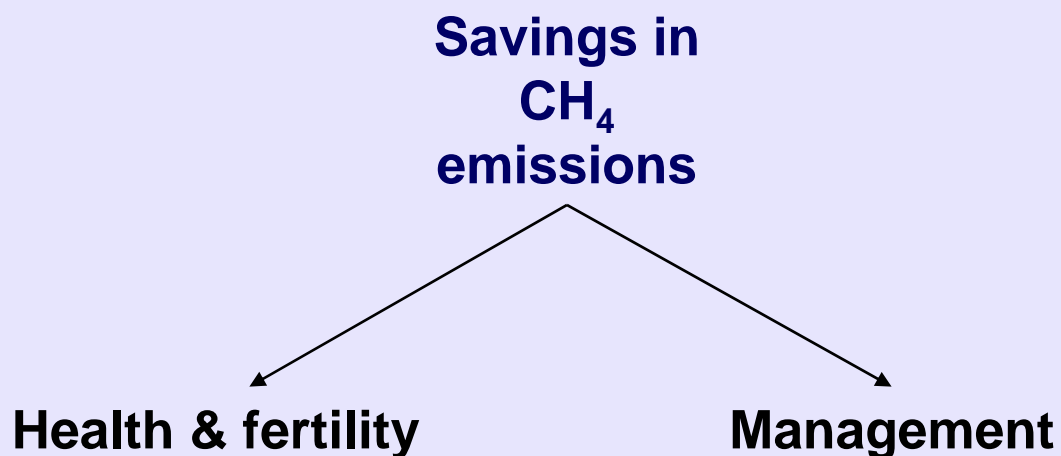
^a Sustainable livestock systems group, SAC

^b School of GeoSciences, University of Edinburgh

Summary



- Assess long-term ways to minimise the methane (CH_4) emissions from a dairy system
- Dairy system = young stock and milking herd
- Data from Langhill herd, in Scotland



A dairy system

Milking herd (84% of year)



Young stock (<2 yrs)



Drying off (16% of year)

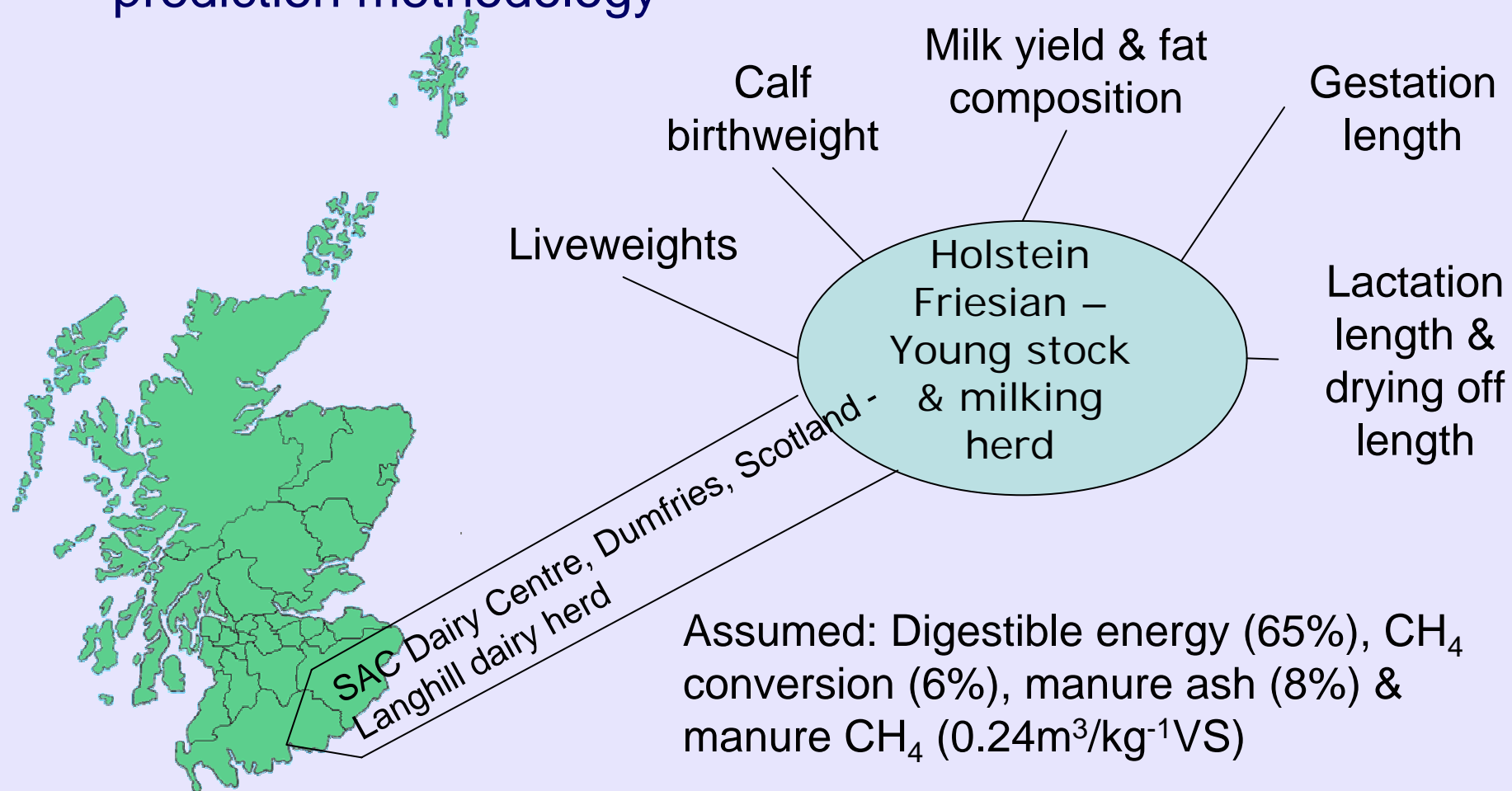


Materials & methods



- 2914 lactations
- 216 milking cows producing 212 calves
- CH₄ emission estimated using IPCC (Intergovernmental Panel on Climate Change) Tier II methodology
- GLMM & chi-squared test to assess associations between health, fertility and involuntary culling
- Involuntary culling = removed from herd due to fertility, foot/leg and udder problem, death or abortion.

- Average figures over 15 years – IPCC (1997) Tier II CH₄ prediction methodology



Results (1)

- Replacement rate 25% per year
- 6852kg milk for 300 DIM
- Young stock produce 26% of dairy system CH₄
- 29 grams CH₄ per kg milk

Results (2)



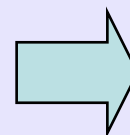
- Dairy system CH₄ emissions minimised by:

Reducing young stock

- Bull calves slaughtered at earliest age
- Heifer replacements selected at earliest age
- Heifer replacements reduced by lower herd replacement rate

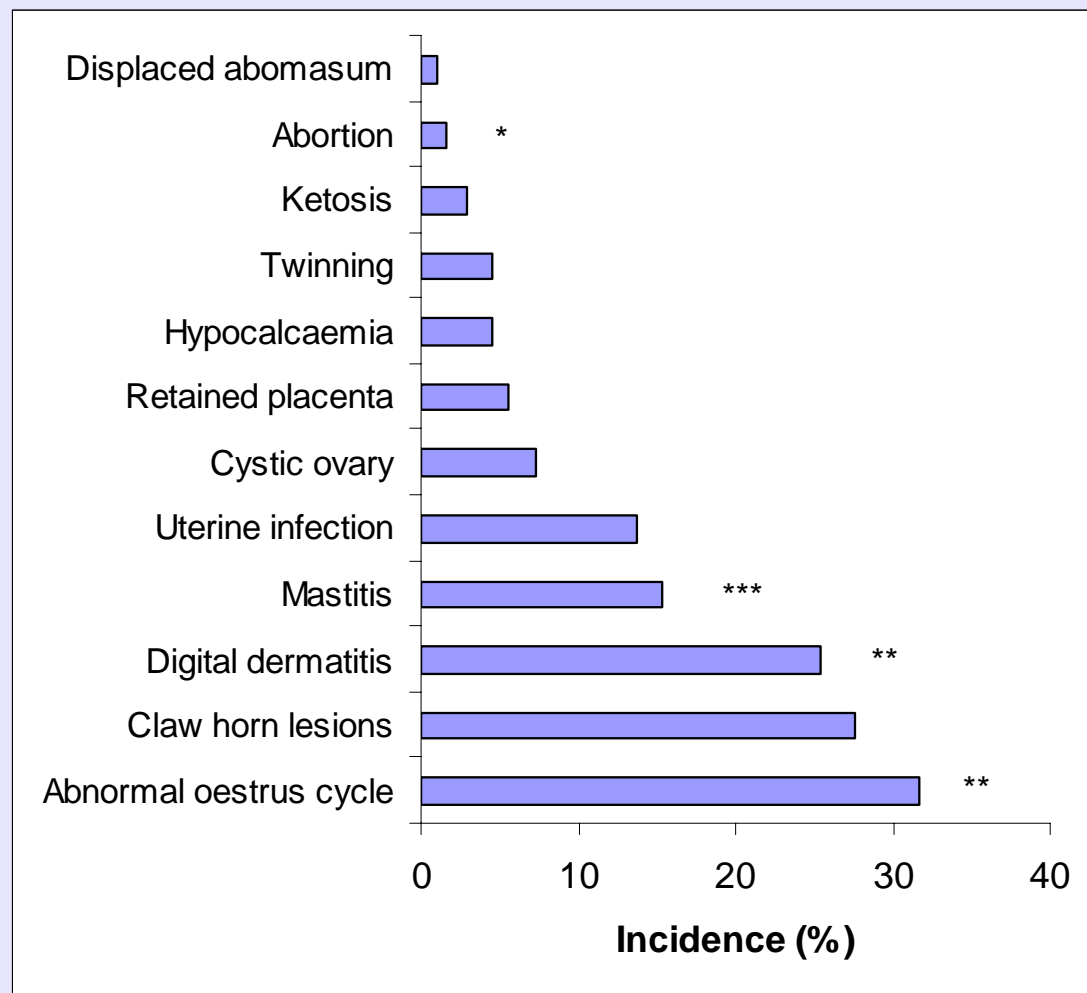
Improved milk production

- Minimising involuntary culling
- Reducing mastitis



Improved milk production

Health & fertility



From 2914 lactations – showing association with involuntary culling

- **Effects**
 - Replacement rate changes from 25 to 20%
 - 5% reduction in heifer emissions – sold at 18 months
 - 3% saving in emissions per kg milk
 - Reduce mastitis incidence from 15 to 5%
 - 4% saving in emissions per kg milk
 - 12 month bull beef sold at 6 months (61% of calves)
 - 24% reduction in CH₄

Whole system

- Greater savings made through reducing young stock rather than altering milking herd numbers
- Savings made through improved production efficiency
- Changes in health, fertility and management can help improve milk production, welfare and CH₄ emissions

Acknowledgements



- This work is funded by the Scottish Government
- Help is gratefully received from



- » Eileen Wall
- » Graham Russell
- » Geoff Simm
- » Dairy research team
- » The cows

