ASSOCIATION OF MILK MIR-DERIVED BODY ENERGY TRAITS WITH FERTILITY PARAMETERS IN COWS

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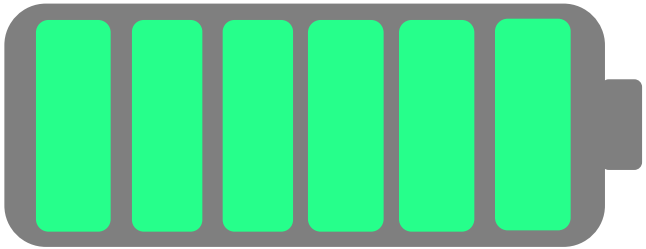
Acknowledgements

Background

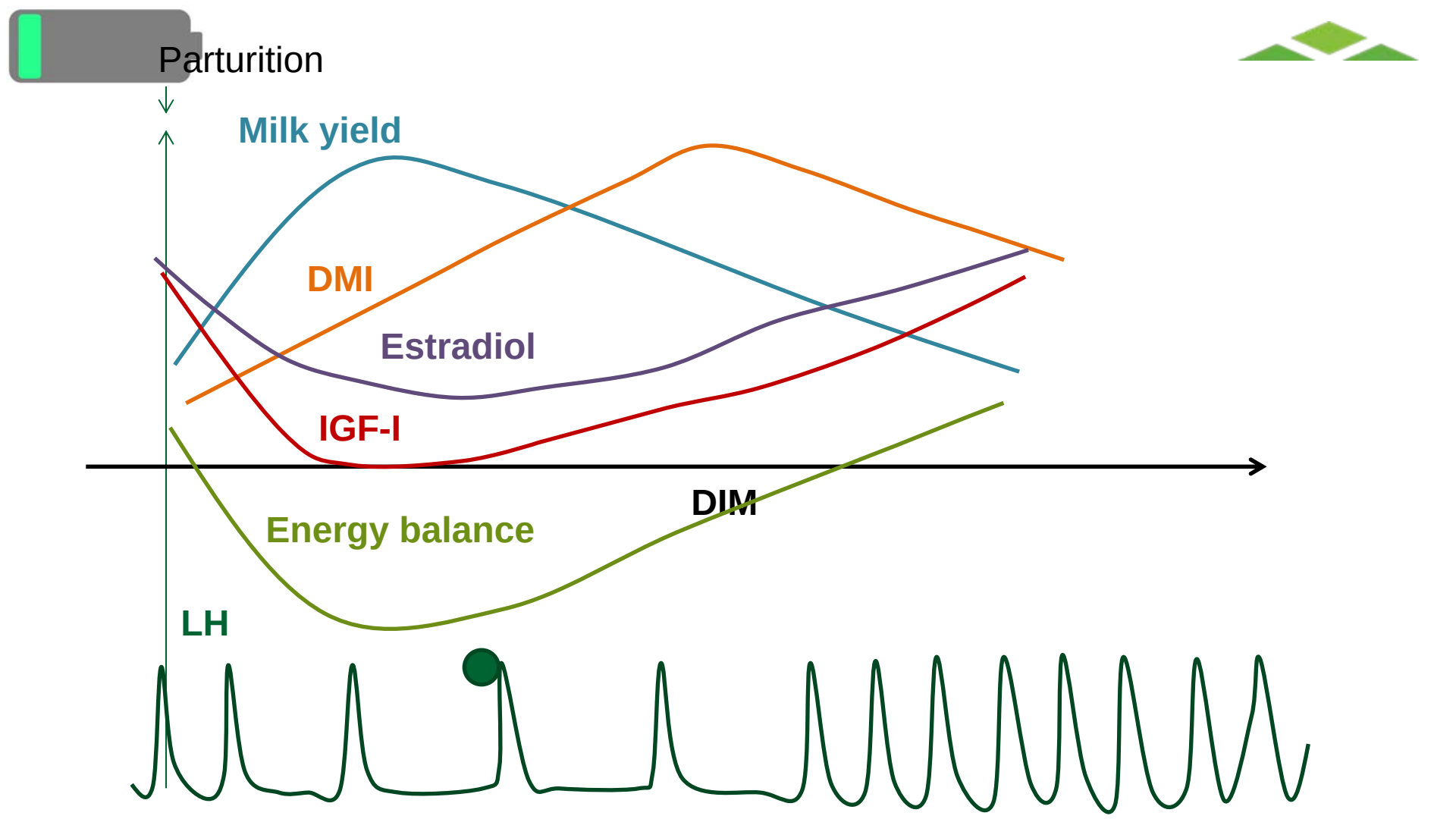


Take home

Break down of approach

Summary

Results


Parturition
Milk yield
DMI
Estradiol
IGF-I
DIM
Energy balance
LH

Association of milk MIR-derived body energy trait

with fertility parameters in cows

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Association of milk MIR-derived body energy traits with fertility parameters in cows

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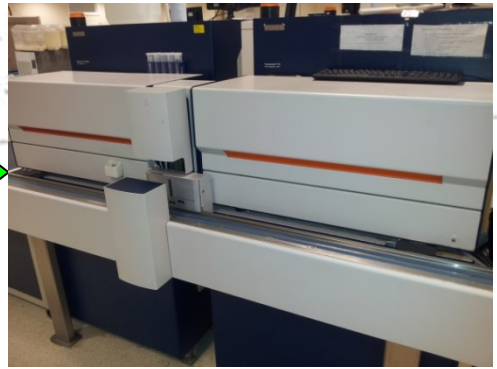
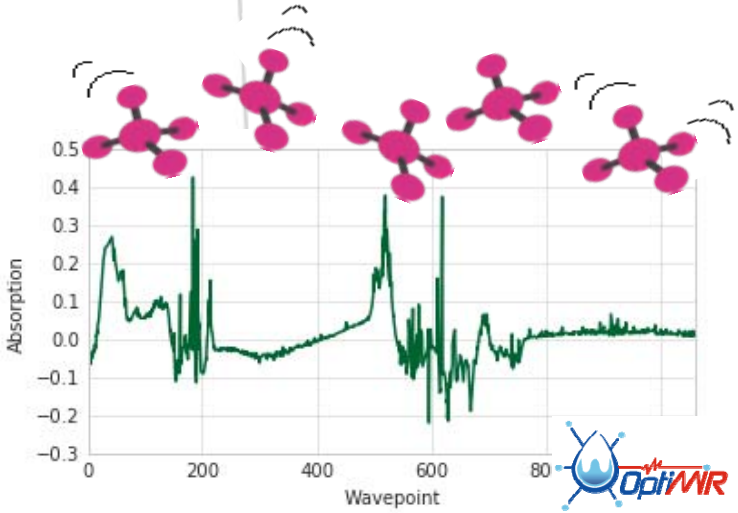
Association of milk MIR-derived body energy traits with fertility parameters in cows





For work at Langhill

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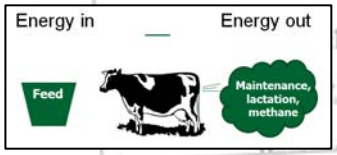
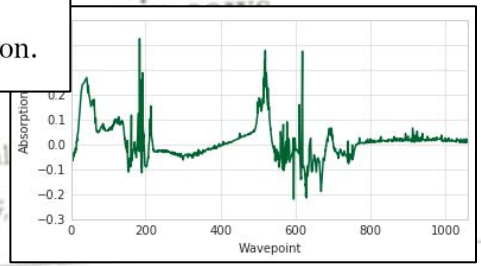
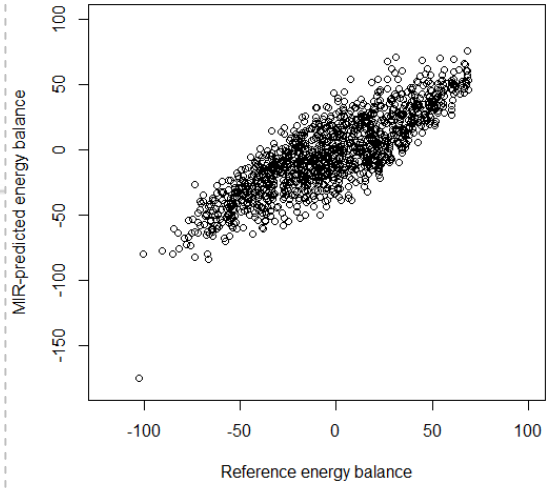




Partial Least Squares Analysis

Predicted *Energy balance*

Validation

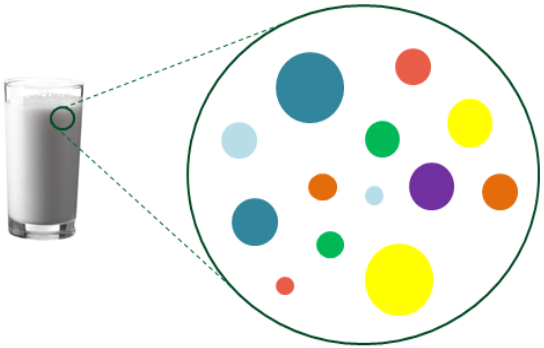


R = 0.84
SEC = 22.7
SDEP = 19
RPD = 1.6

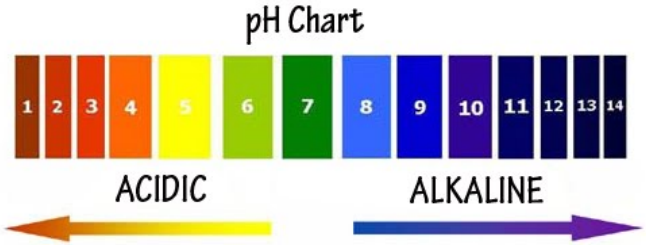
Association of milk MIR-derived body energy traits

s in cows

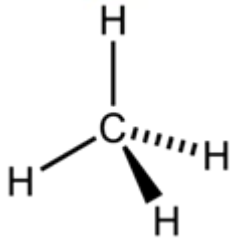
Acidity (de Marchi et al., 2009)



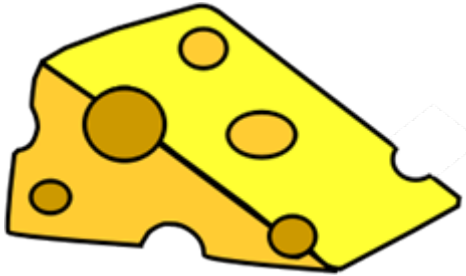
Energy profiles
(McParland et al., 2011)

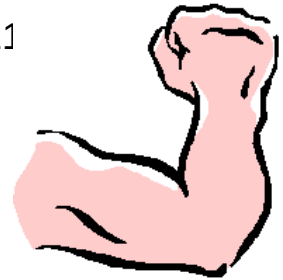


Methane emissions
(Dehareng et al., 2012)



Fatty acids (Soyeurt et al., 2011





Milk proteins
(Rutten et al. 2011)

Pregnancy
(Laine et al., 2013)

Cheese making properties (de Marchi et al., 2013)

Association of milk MIR-derived body energy traits with fertility parameters in cows

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Presenting author: S. Smith

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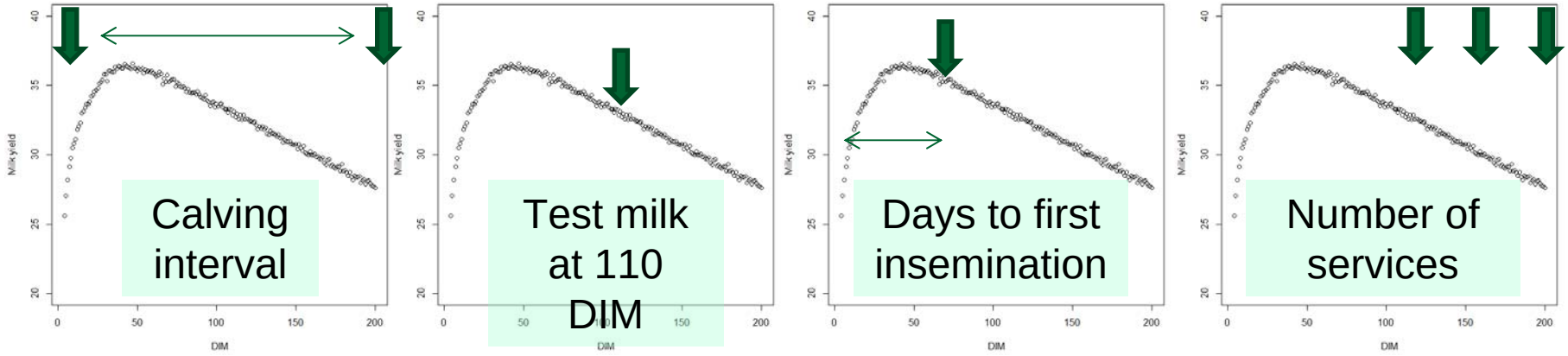
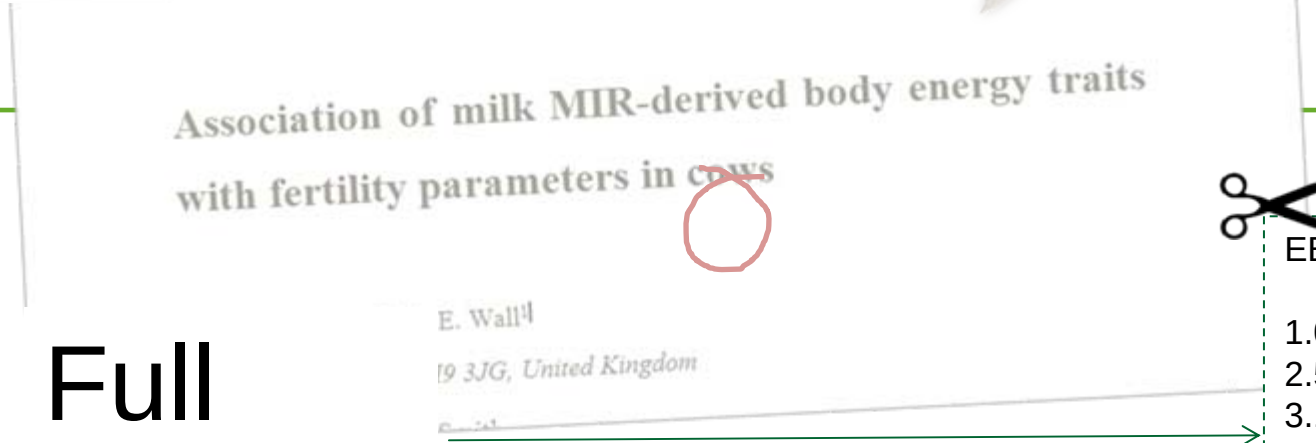
Association of milk MIR-derived body energy traits with fertility parameters in cows

- Obtained through collaborations/ pipeline for national evaluations
- Contemporary records (animal, lactation) with milk MIR records



Association of milk MIR-derived body energy traits with fertility parameters in cows

- Animals with fertility records and mid-infrared spectral data
- DIM < = 200
- Holstein-Friesian cows
- Fertility edits according to Wall et al., (2003)
- 1st 200 daughters retained from all sires ordered by birth date
- At least 3 test day per animal/ lactation
- First EB record within 30 DIM
- At least 5 records per herd year season of calving
- Fertility record aligned with first EB record (unless otherwise stated)



Full dataset

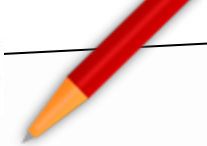
Bivariate

EB records from:

1.0 < = x < = 50 DIM
2.50 < x < = 100 DIM
3.100 < x < = 150 DIM
4.150 < x < = 200 DIM

with single fertility record (joined on min DIM record)

Bivariate



Association of milk MIR-derived body energy traits with fertility parameters in cows

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Association of milk MIR-derived body energy traits with fertility parameters in cows

- Uni-/bi-/tri-variate linear animal models of MIR predicted energy balance, milk yield and fertility traits
- Fixed effects: lactation, month of calving, age @ 1st calving, DIM (for MIR traits)

Association of milk MIR-derived body energy traits with fertility parameters in cows

No. herds	3,313
No. animals	108,018
No. lactations	4
No. records	709,142

ed Kingdom

Range of birth dates	Sept 2004 - Dec 2014
Range of calving dates	Feb 2013 - Jul 2016
Range of MIR-derived EB records	Mar 2013 - Feb 2017

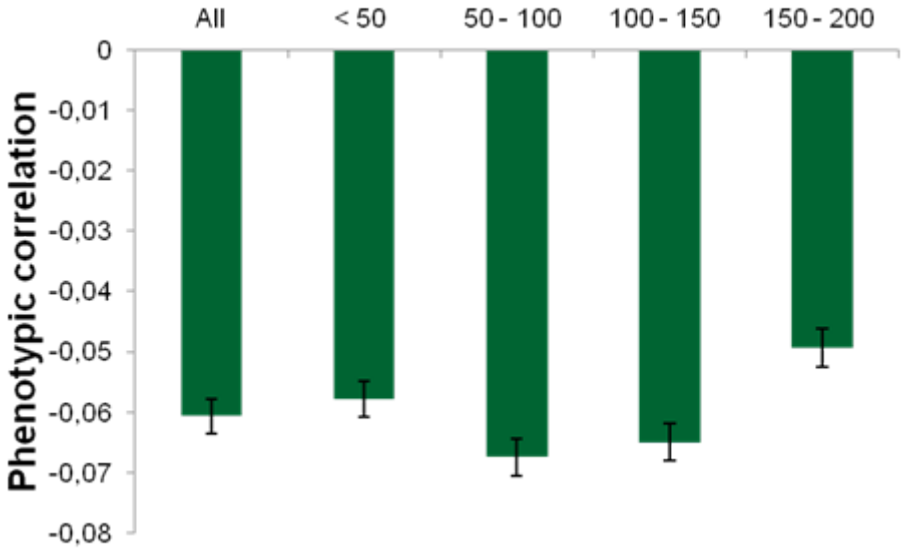
Avg. no. EB records per animal/lactation	5.6
Avg. no. of lactations per animal	1.1

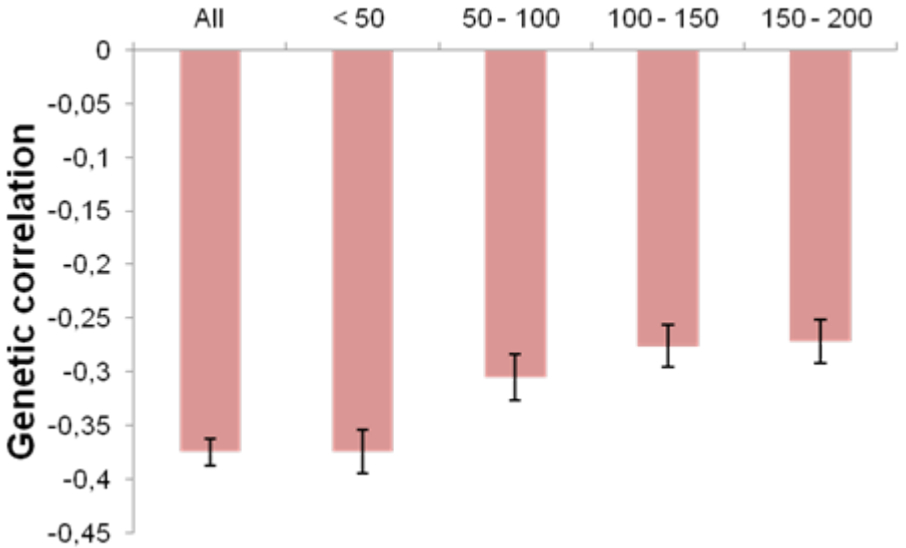
Trait	Average	Stdev	Min	Max
Energy balance	-3.3	29.4	-120.1	86.1
Calving interval	390.5	57.0	301.0	599.0
Test milk 110 days	32.9	9.1	5.0	60.0
Days to first service	71.7	28.7	20.0	200.0
Number of inseminations	2.1	1.3	1.0	7.0
Age calving 1st lactation	27.0	4.2	18.0	47.0

+ pedigree with 364,435 animals generations 0 to 4

Results- EB & calving interval

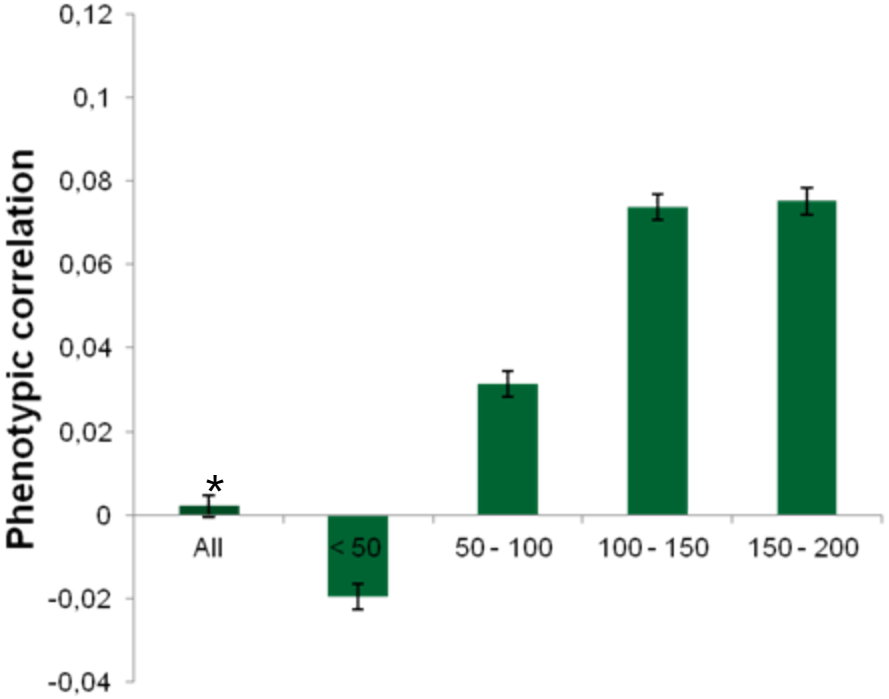
EB records in 50 DIM windows with fertility records

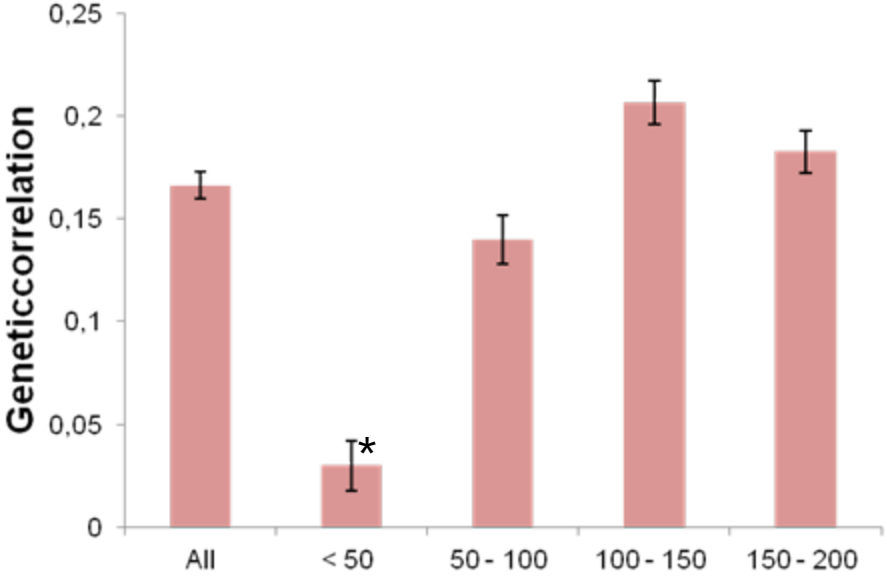




Results – EB & milk@110

EB records in 50 DIM windows with milk yield @ 110

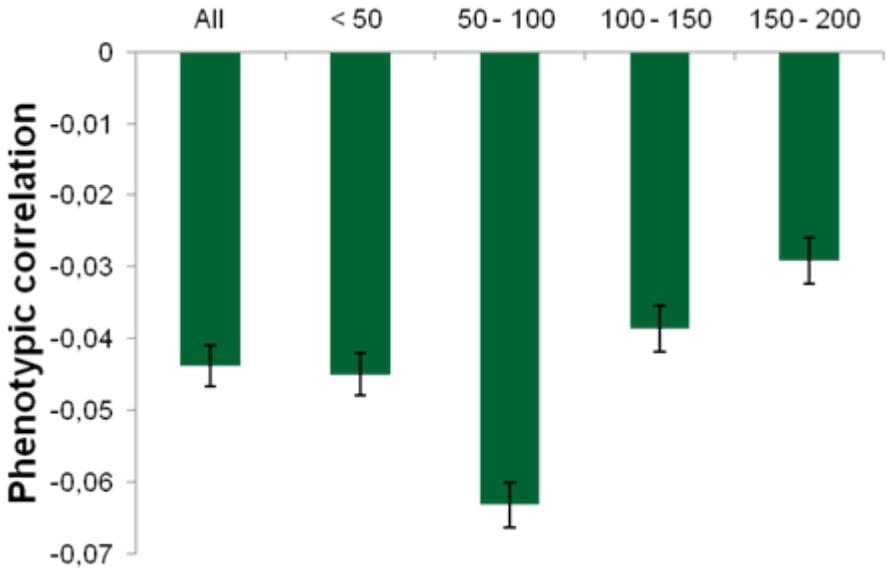


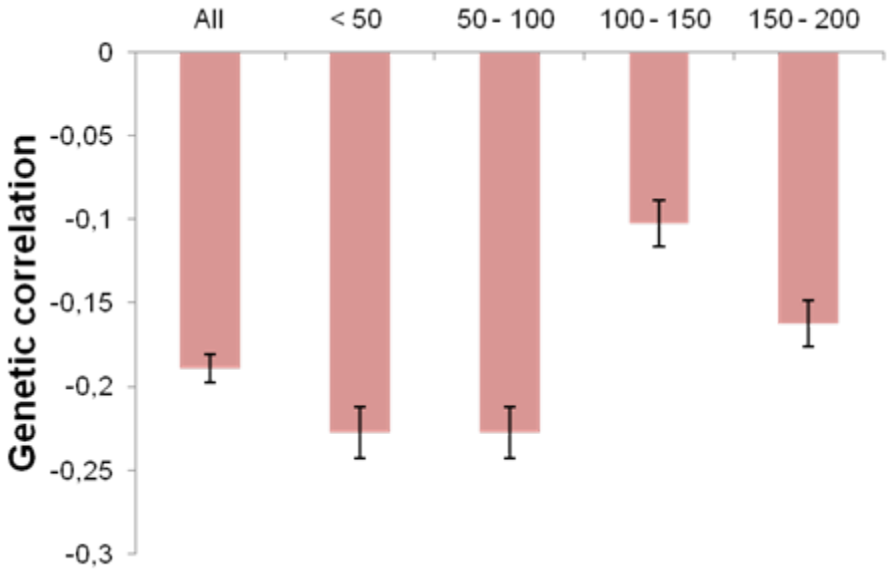


* non-significant results

Results – EB & days to 1st service

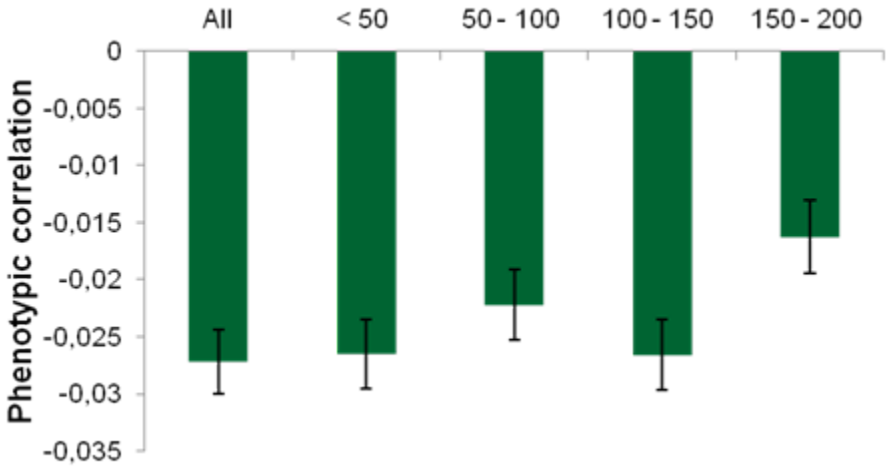
EB records in 50 DIM windows with fertility records

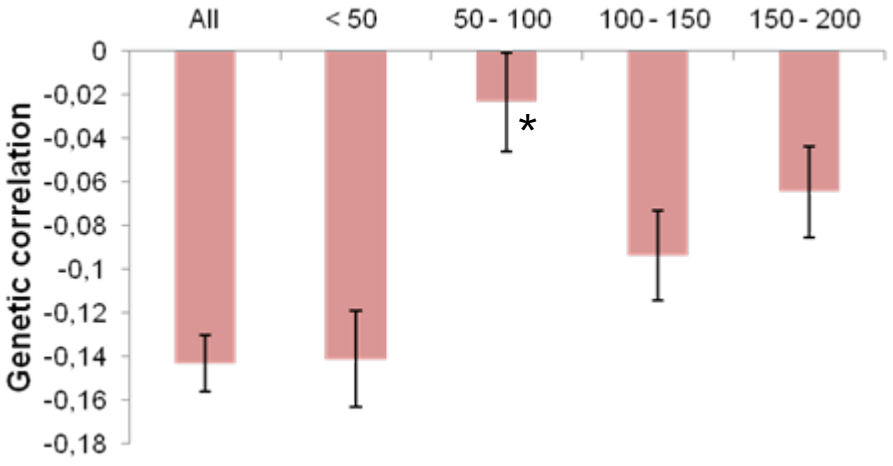




Results – EB & No inseminations

EB records in 50 DIM windows with fertility records

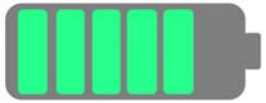




* non-significant results

Summary

- The genetic correlation between EB and milk yield is **weakest earliest in lactation and its strength increases with increasing DIM**
- The genetic correlation between EB and fertility is **highest (and unfavourable) earliest in lactation and its magnitude decreases later in lactation**
  - Correlation of EB with fertility traits (-0.37 w/ CI; -0.2 w/ DFS; -0.14 w/ NI) comparable with literature e.g.
  - r_g BCS & CI = -0.36 (Pryce et al., 2001)
  - r_g BCS & Int 1stServ = -0.47 to -0.3 (Berry et al., 2003)
  - r_g BCS & NI = -0.34 to -0.17 (Berry et al., 2003)



Take home messages

1. Mid infra-red analyses of milk is providing an increasing suite of phenotypes which can be generated as part of routine milk recording and used in routine genetic evaluations
2. Selecting for improved energy balance profile could help to improve fertility given the genetic correlation between the traits
3. Next steps: further study the correlations between MIR energy traits and fitness traits within and across lactations as lifetime longitudinal profiles are built up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