Risk factors associated with reproductive tract status

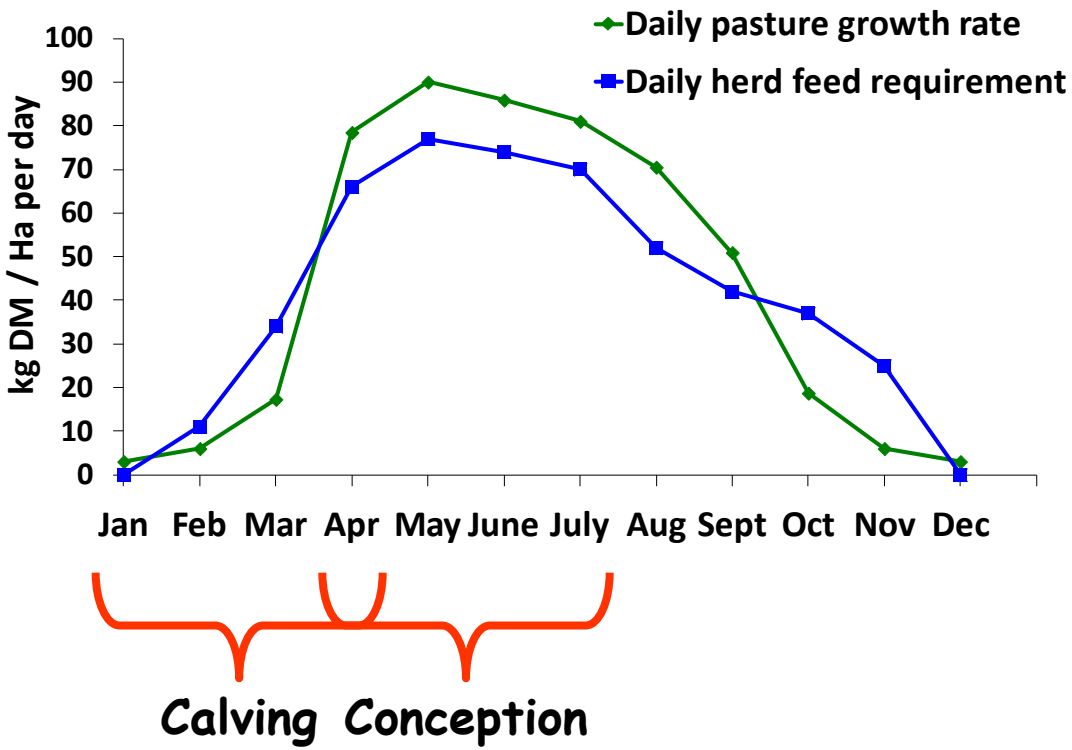
T. Carthy[1,2], A. Fitzgerald[1,4], S. McParland[1], D.P. Berry[1], E.J. Williams[2], A.R. Cromie[3] and D. Ryan[4]

[1]Animal & Grassland Research and Innovation Centre, Teagasc, Moorepark, Fermoy, Co. Cork`, Ireland
[2]School of Veterinary Medicine,University College Dublin, Belfield, Dublin4, Ireland
[3]Irish Cattle Breeding Federation, Bandon, Co. Cork, Ireland
[4]Reprodoc Ltd., Fermoy, Co. Cork, Ireland

Background

Spring calving systems

- Peak feed demand coincides with peak grass growth
- Compact calving season
- Maintain 365 day calving interval



Background

- Fertility can be difficult to measure
  - Management and environment
  - Genetics

- Detailed reproductive traits which are less affected by management and environment should provide a better indication of fertility

Objectives

- Derive detailed reproductive traits in dairy and beef cattle using ultrasound examinations

- Quantify risk factors associated with these detailed reproductive traits

Increase genetic gain for fertility in breeding programs

Materials and methods

- Ultrasound performed transrectally
- Data edits
  - Calving interval 300-800 days
  - < 600 days since last calving
  - Records after a recommended treatment were discarded
- 136,212 ultrasound records from 72,954 cows in 806 dairy and beef herds were retained

Derived phenotypes

Cycling

- The presence of a corpus luteum (CL) - indicating a resumption of normal oestrus cyclicity

Derived phenotypes

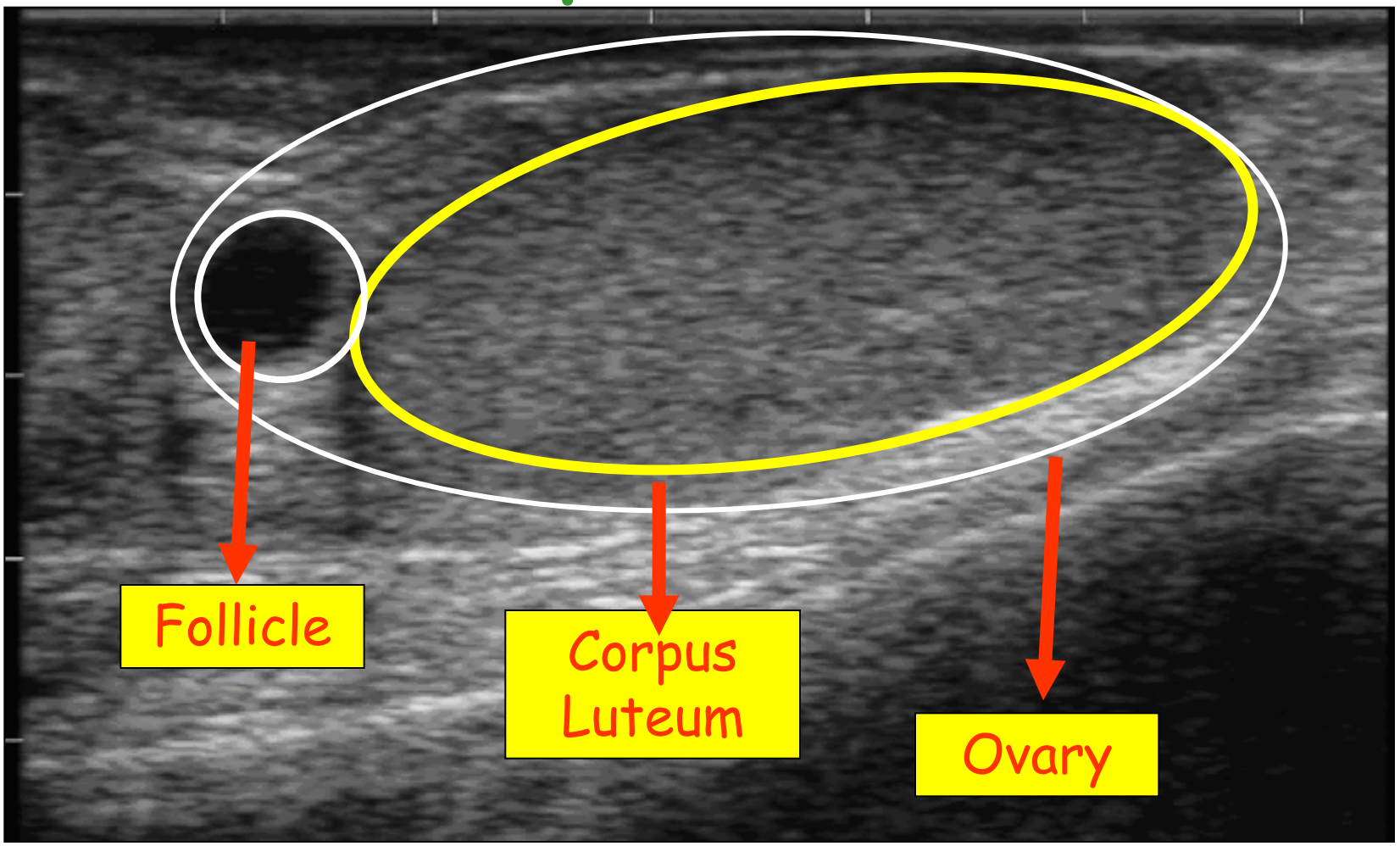
Cycling

- The presence of a corpus luteum (CL) - indicating a resumption of normal oestrus cyclicity

Early ovulation

- Cyclicity resumed within 15 days post partum

Corpus Luteum



Derived phenotypes

Cycling

- The presence of a corpus luteum (CL) - indicating a resumption of normal oestrus cyclicity

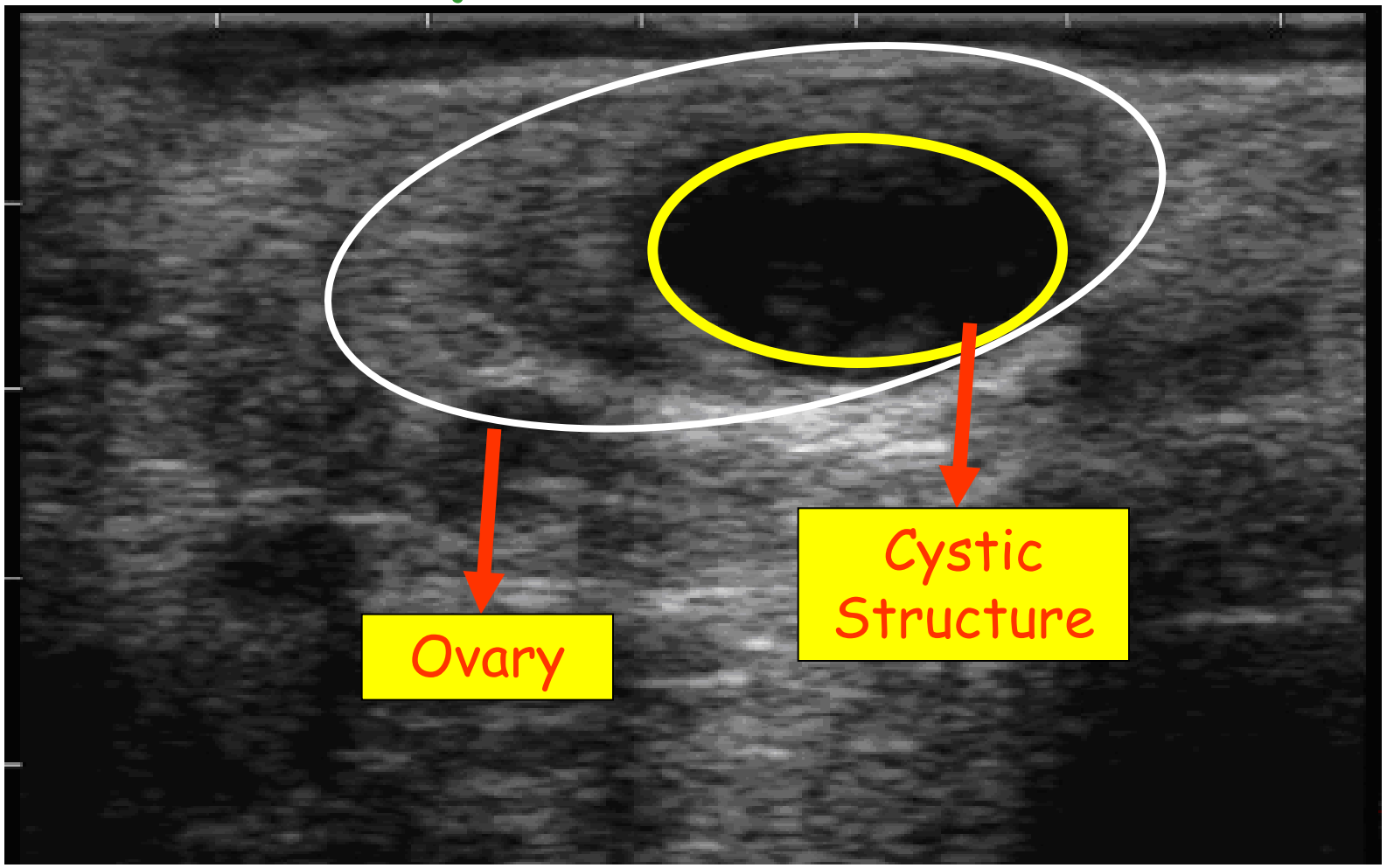
Early ovulation

- Cyclicity resumed within 15 days post partum

Cystic structures

- The presence of a cystic structure on the ovaries

Cystic structure



Derived phenotypes

Cycling

- The presence of a corpus luteum (CL) - indicating a resumption of normal oestrus cyclicity

Early ovulation

- Cyclicity resumed within 15 days post partum

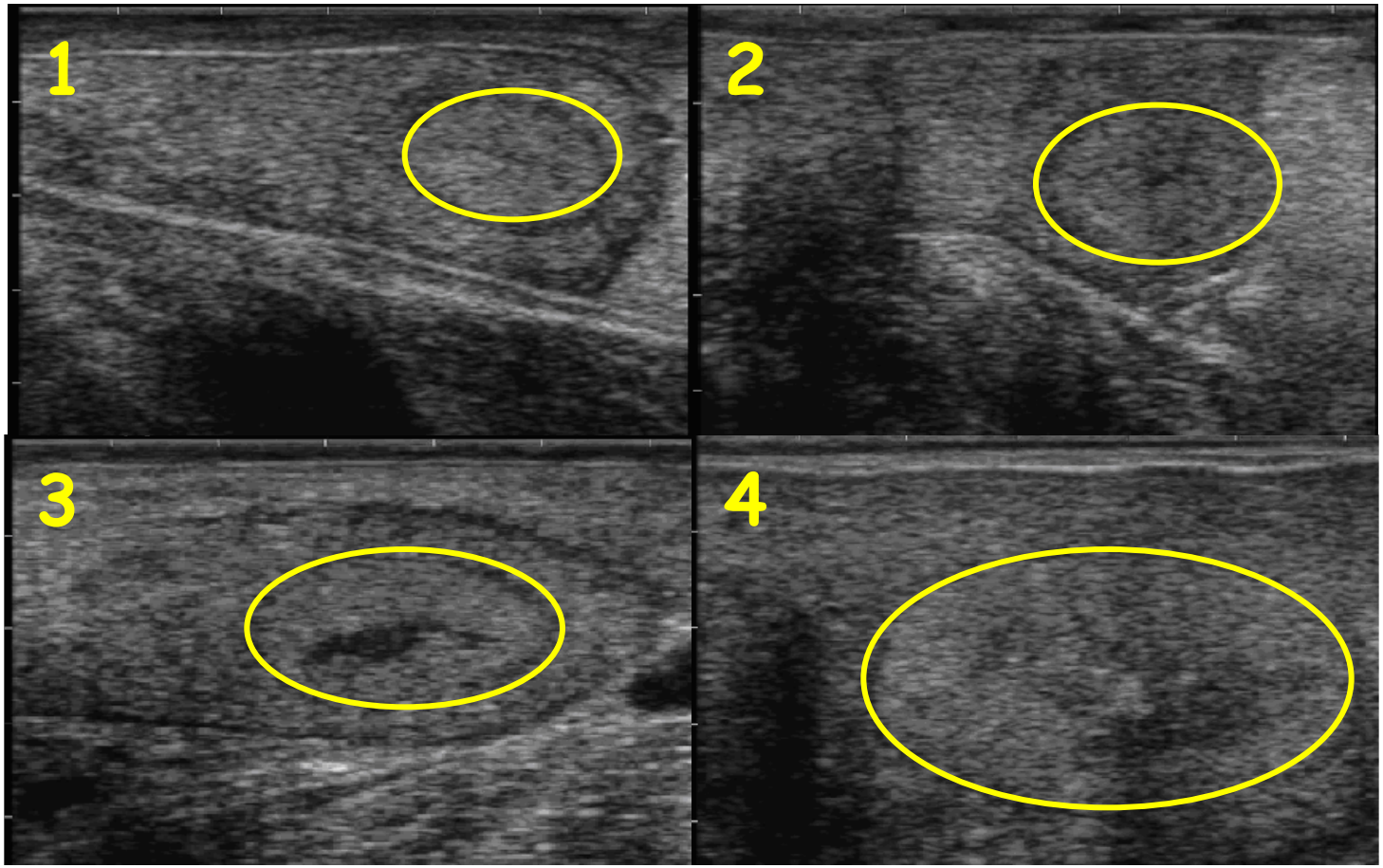
Cystic structures

- The presence of a cystic structure on the ovaries

Uterine score

- Measure of fluid and inflammation of the uterus

Uterine horns



1) no inflammation, 2) slight inflammation, 3) considerable inflammation and 4) serve inflammation.

Derived phenotypes

Cycling

- The presence of a corpus luteum (CL) - indicating a resumption of normal oestrus cyclicity

Early ovulation

- Cyclicity resumed within 15 days post partum

Cystic structures

- The presence of a cystic structure on the ovaries

Uterine score

- Measure of fluid and inflammation of the uterus

Embryo loss

- Presence of unviable/loss of an embryo

Statistical Analysis

- **Factors associated with the detailed fertility traits were determined using ASREML**
  - Logistic regression
  - Linear mixed models
- **The model**

Fixed effects:

Parity

Stage of lactation

Dystocia

Year and month of examination

Herd type (dairy vs beef)

Breed composition of the cow

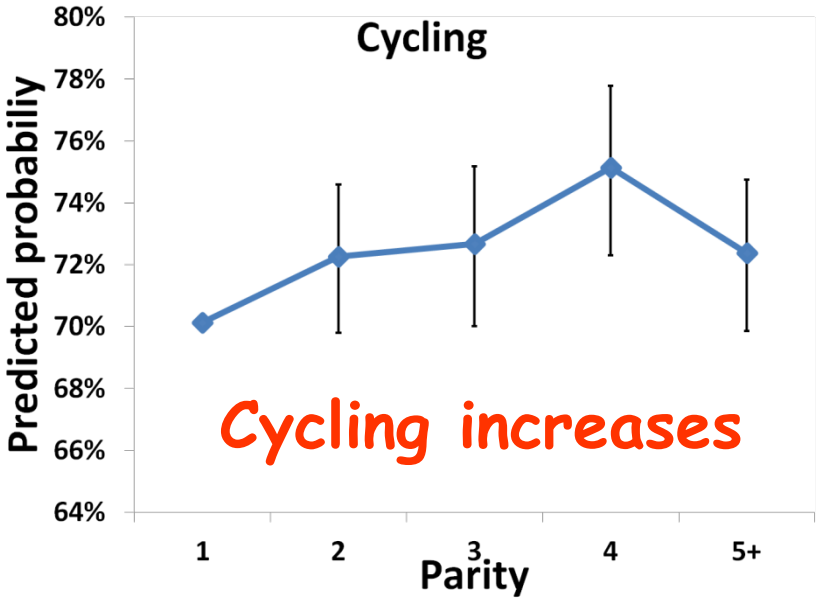
Heterosis & Recombination loss of the cow

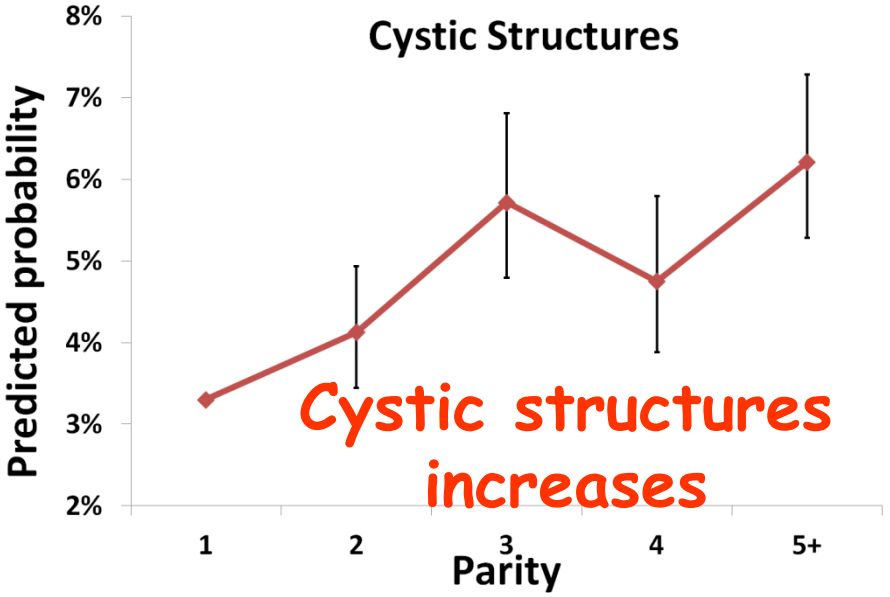
Random effects:

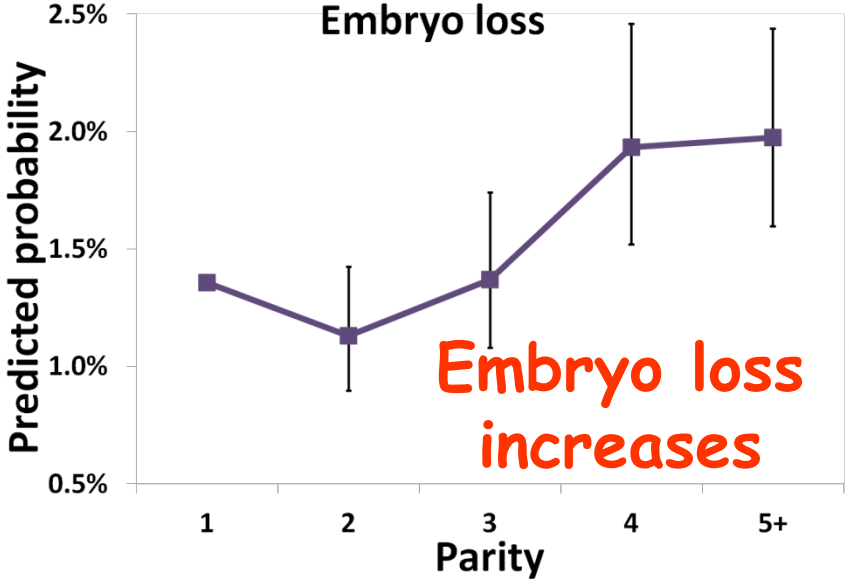
Cow

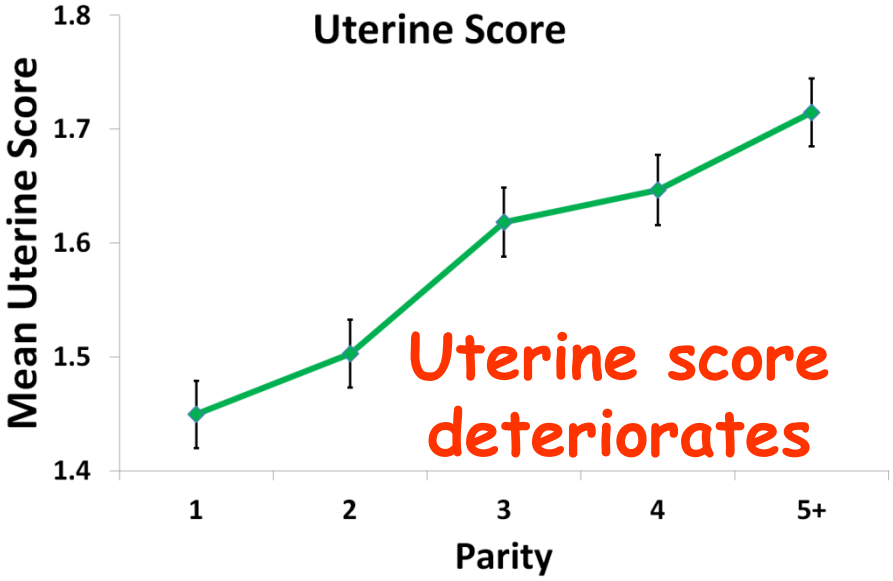
Herd-year-season

As parity increases

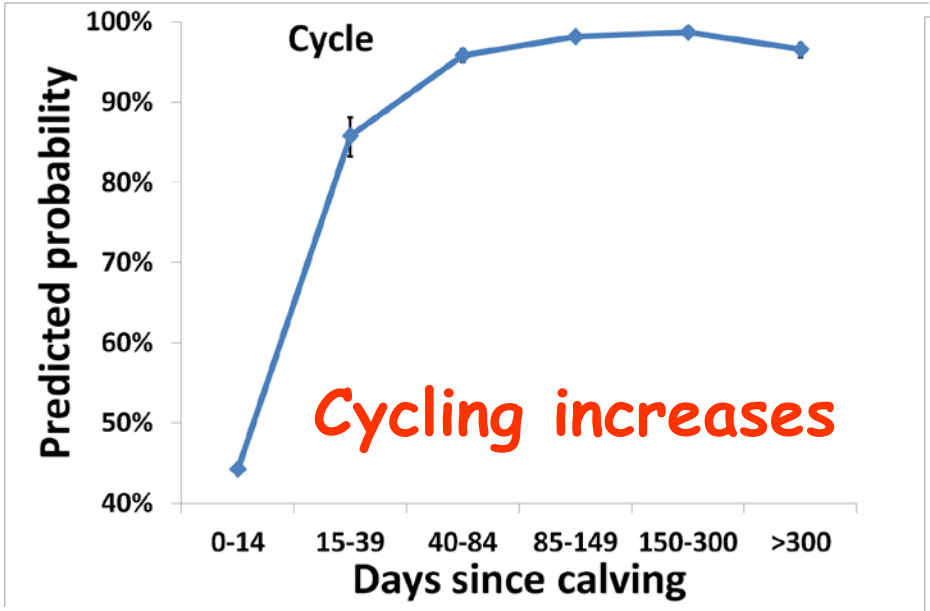


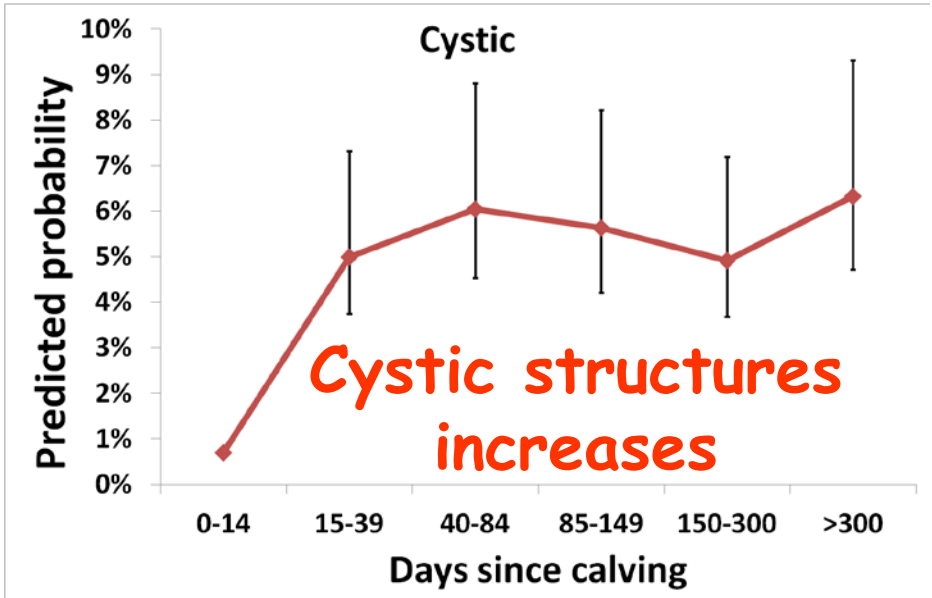


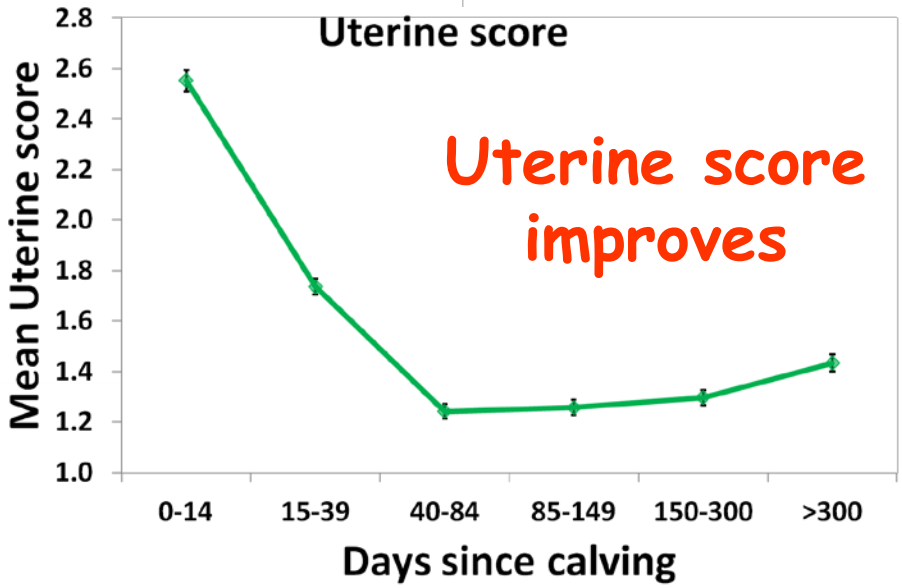




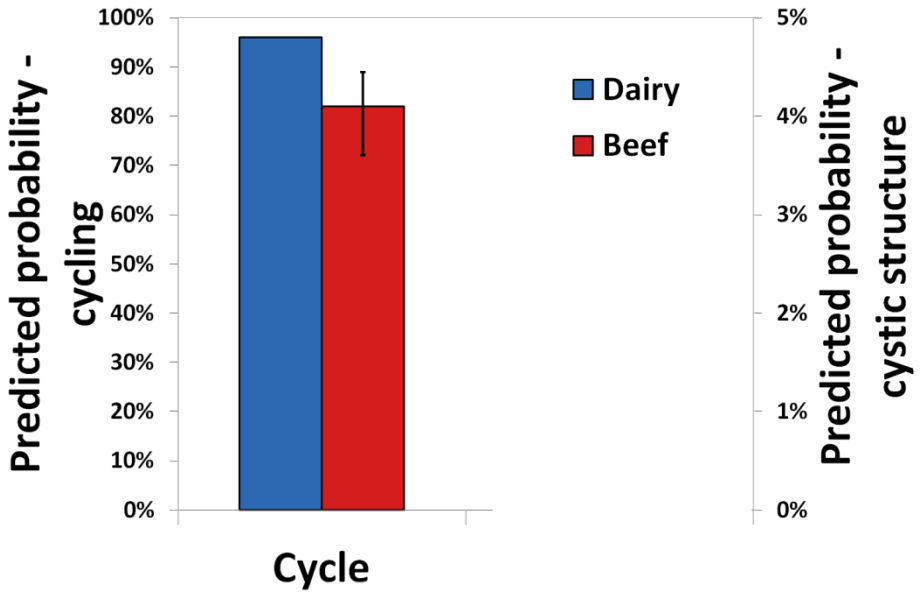
As stage of lactation increases

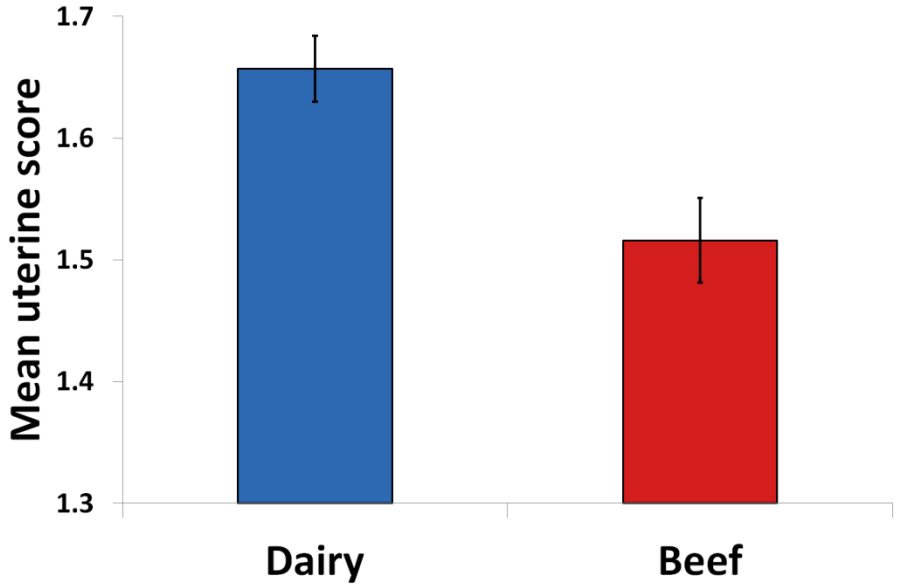






Herd type





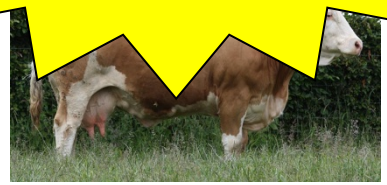
Cows in beef herds

- Less likely to be cycling ($P<0.01$)
- Lower likelihood of cystic structures ($P<0.05$)
- Have a better (lower) uterine score ($P<0.001$)

Beef breeds - cycling

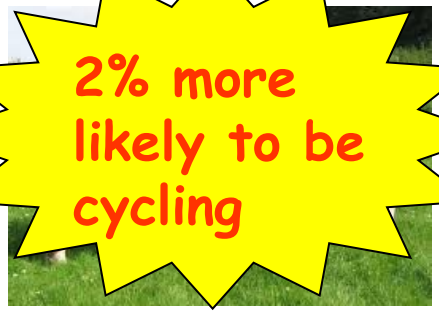
Holstein

6-11% less likely to be cycling



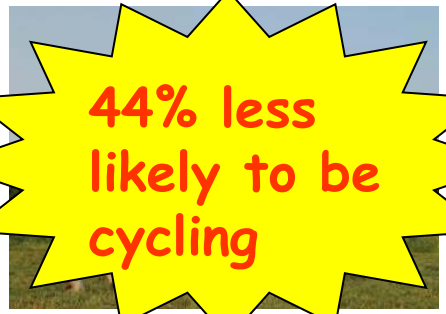
Simmental

2% more likely to be cycling



Hereford

44% less likely to be cycling



Belgian Blue

Dairy breeds - cycling

Holstein

2% more likely to be cycling

Jersey

32% less likely to be cycling

Norwegian Red

1% more likely to be cycling

Montbelliarde

Breed composition

Holstein and Friesian breed composition are associated with an increase in cystic structures

Belgian Blue, Charolais and Montbelliarde breed composition are associated with an a poorer uterine score

Conclusion

- Ultrasound technology provides a useful information on detailed reproductive traits

- Risk factors identified used in genetic evaluation of detailed reproductive traits

Genetic variance exist, therefore selection of these traits are possible

Acknowledgement

OptiMIR

Research Stimulus Fund (11/S/133)

Questions?