IRISH CATTLE BREEDING FEDERATION

# Female Fertility - Are we at the limit or can we further improve using genetics?

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# Genetic Improvement

Is the trait economically important?

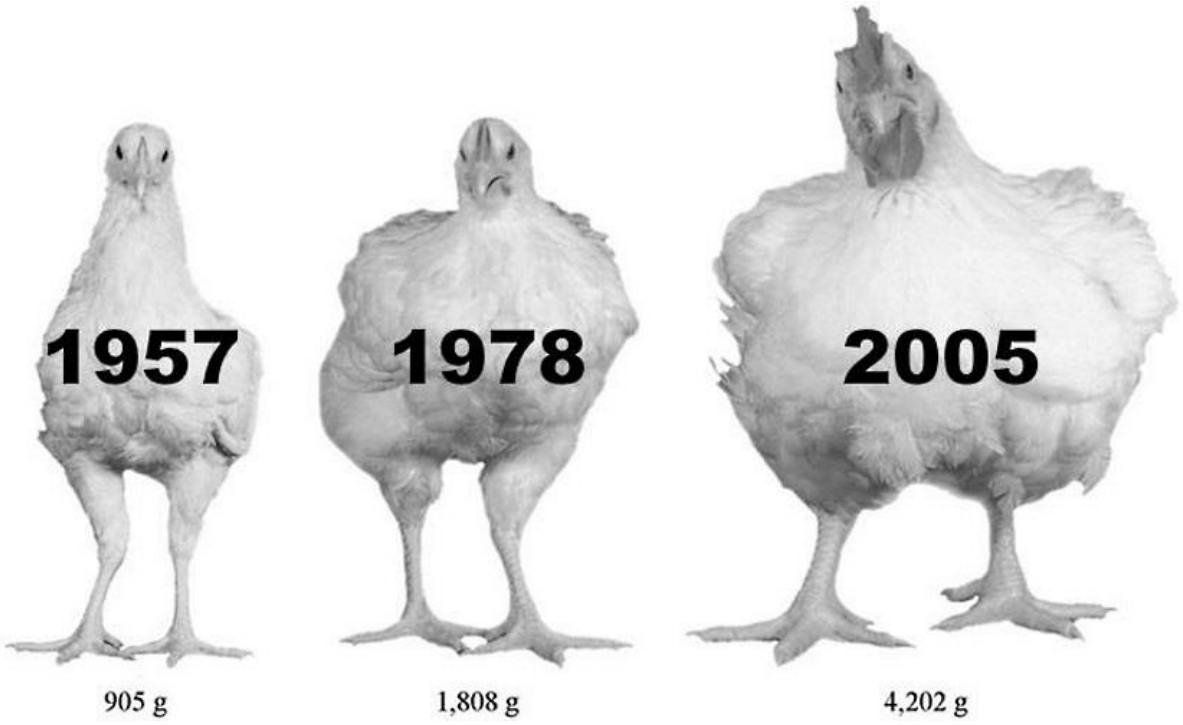
Is there data/can it be collected (easily)?

Is Heritability > 0

Calculate a breeding value (PTA) & reliability

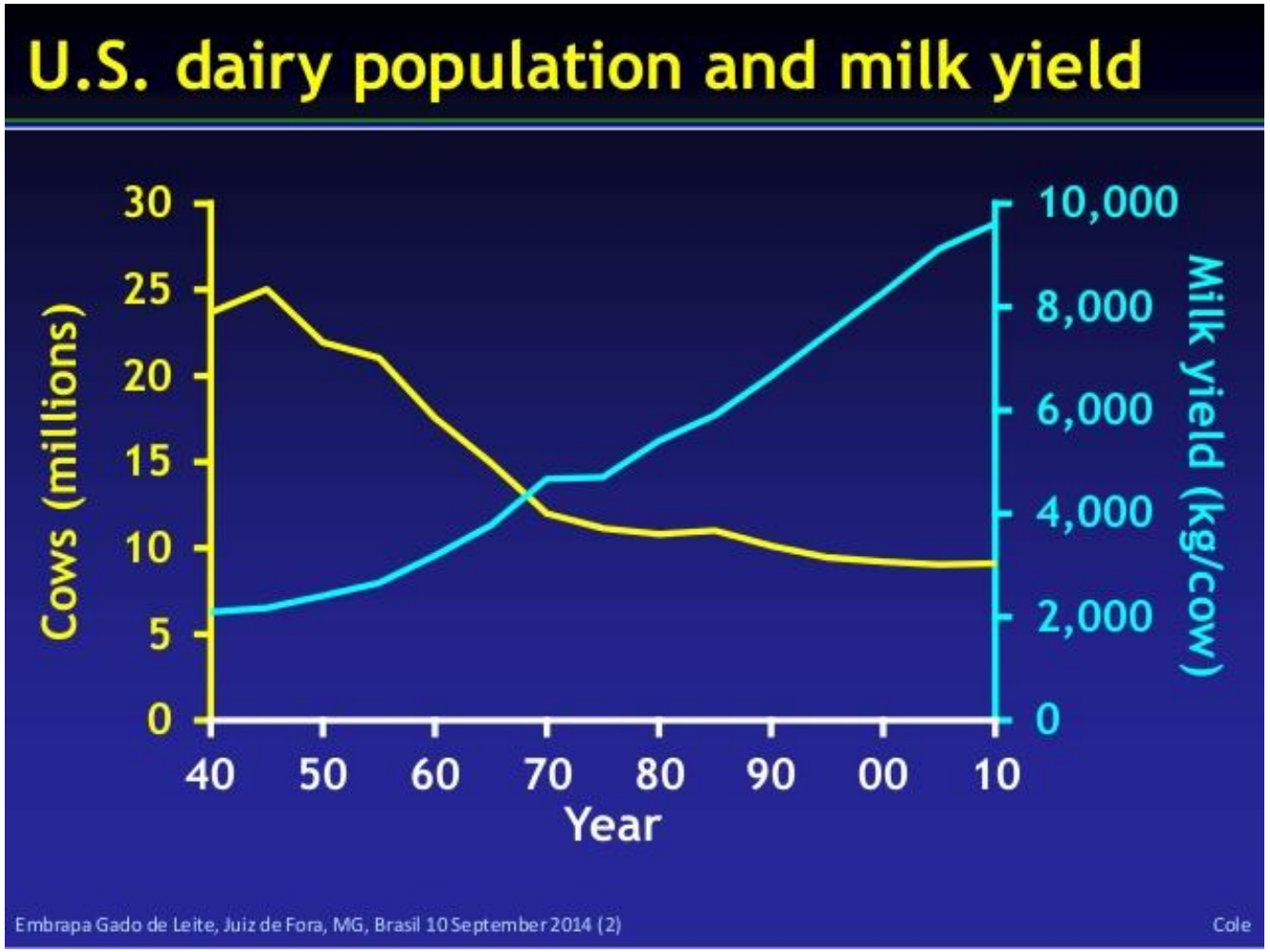
Combine into overall & sub index

# Genetic Improvement




The three chickens you see above were raised on the exact same diet, for the same length of time, and under the same conditions. The left-hand chicken is a breed from 1957. The middle chicken is a breed from 1978. The right-hand one is a breed from 2005.

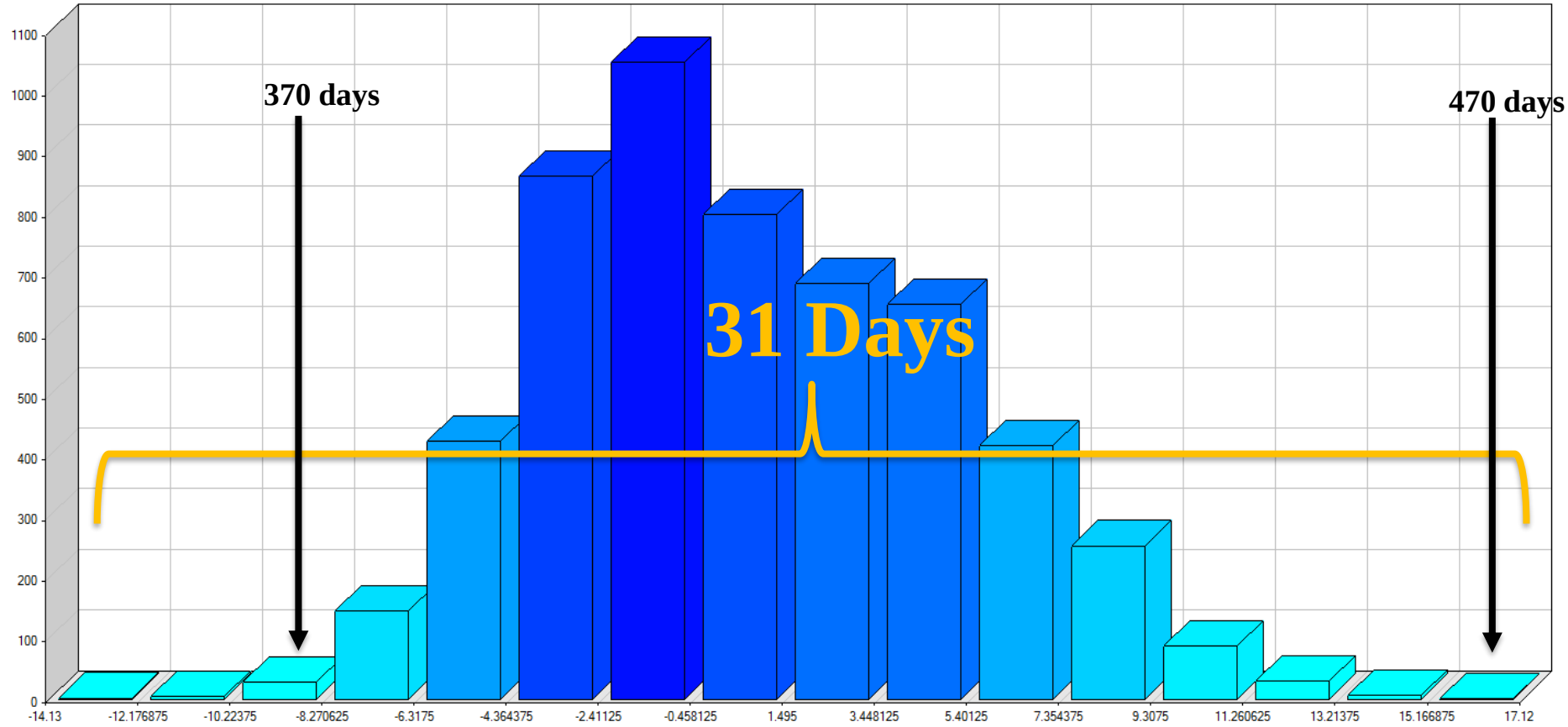
# Genetic Improvement



# Female Fertility

- Causes of poor fertility are complex and multi-factorial
  - Genetics
  - Health
  - Management
  - Nutrition
- Infertility is still a large cost of dairy farms
- Intense selection for milk production led to a reduction in fertility =>genetic impact
- Heritability > 0 & large genetic variability across sires

# Distribution of AI sire CI PTA




Calving Interval

# Teagasc Next Gen 2013 - 2016

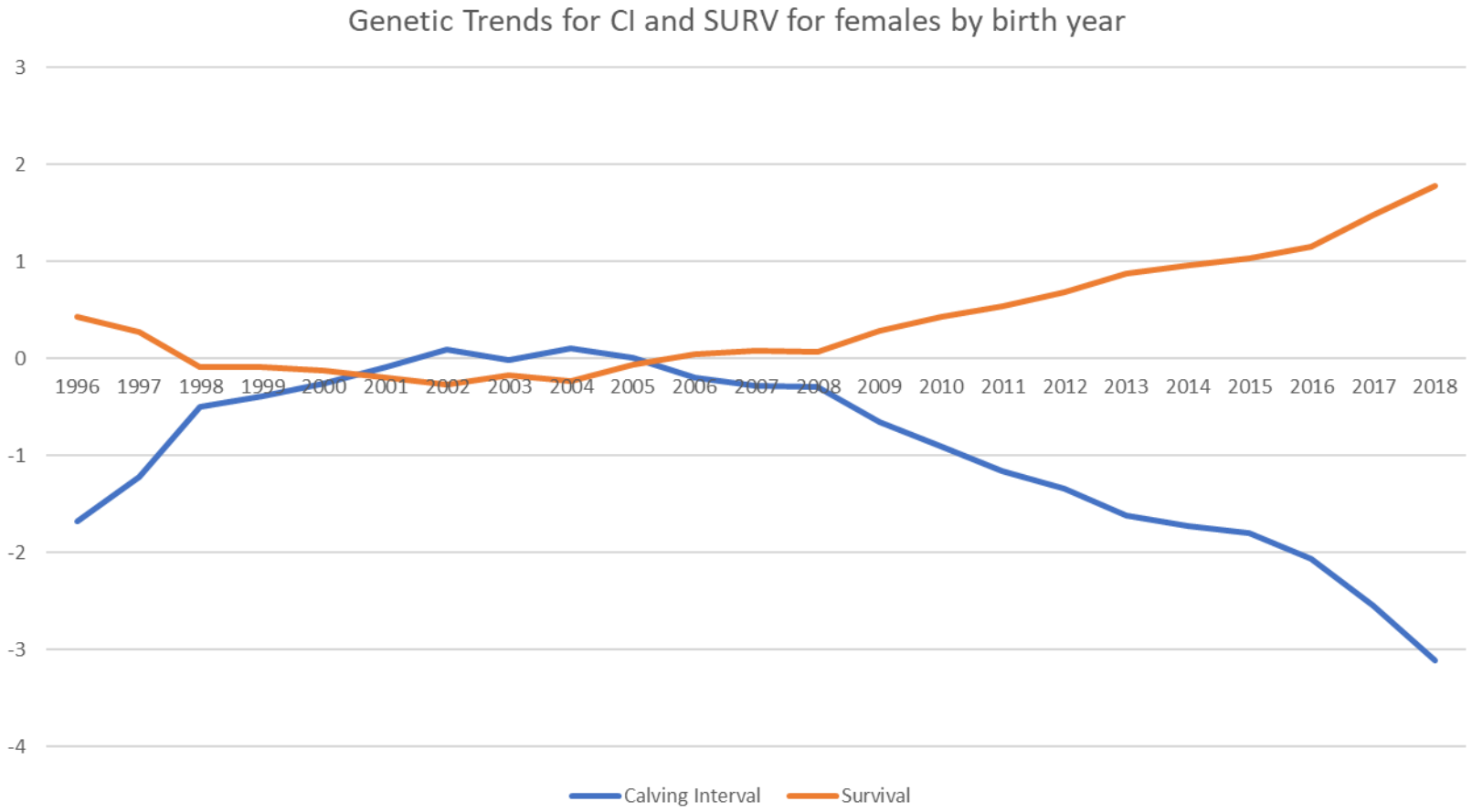
| | Elite | NatAv |
|---|---|---|
| Submission rate (%) | 92 | 86 |
| Pregnancy rate first service (%) | 60 | 46 |
| 6 week in-calf rate (%) | 73 | 58 |
| Final pregnancy rate – 12 wks (%) | 92 | 81 |
| Calving to conception interval (days) | 93 | 97 |
| No. of services | 1.57 | 1.77 |

 O' Sullivan, 2017

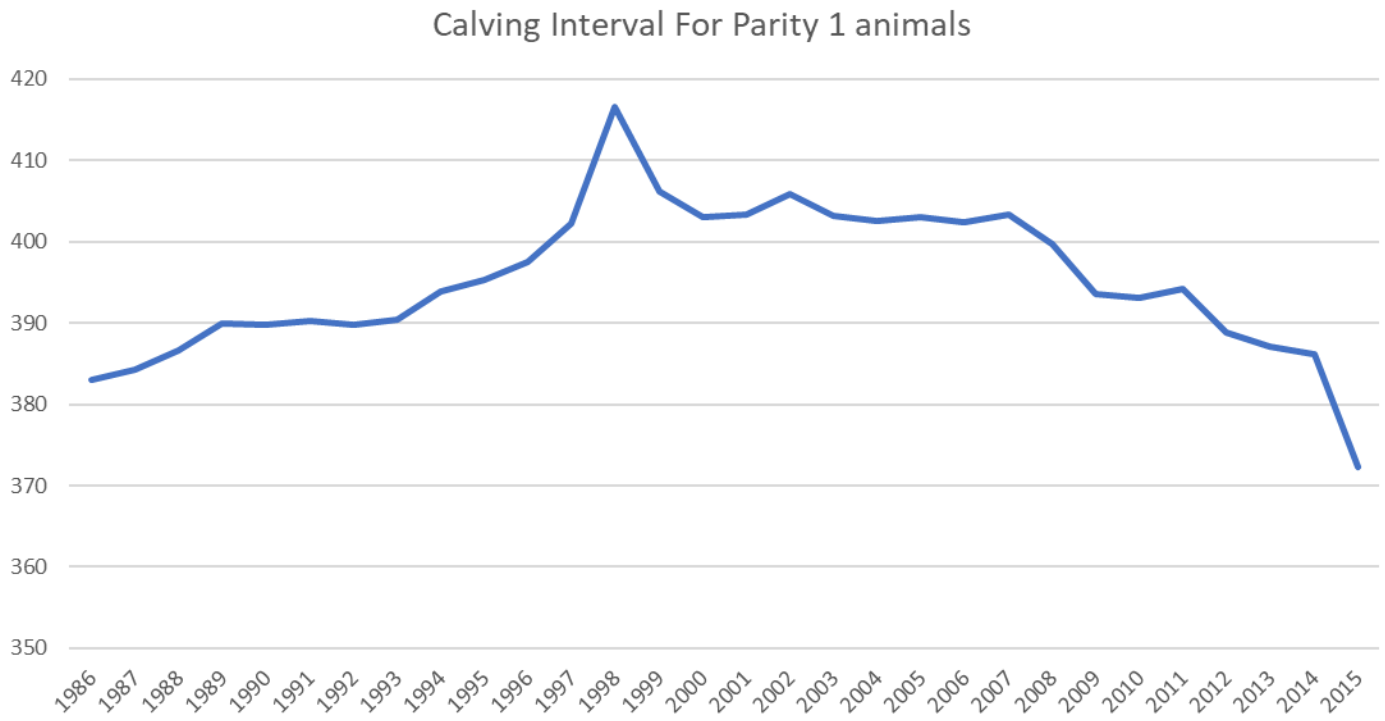
# Current Evaluation

- Multi-trait model with 23 genetically correlated traits
  - Calving interval (parity 1 to 5)
  - Survival (parity 1 to 5)
  - Milk (parity 1 to 5)
  - Number of Inseminations (parity 1 to 3)
  - Calving to first service (parity 1 to 3)
  - Age at first calving
  - Lifespan

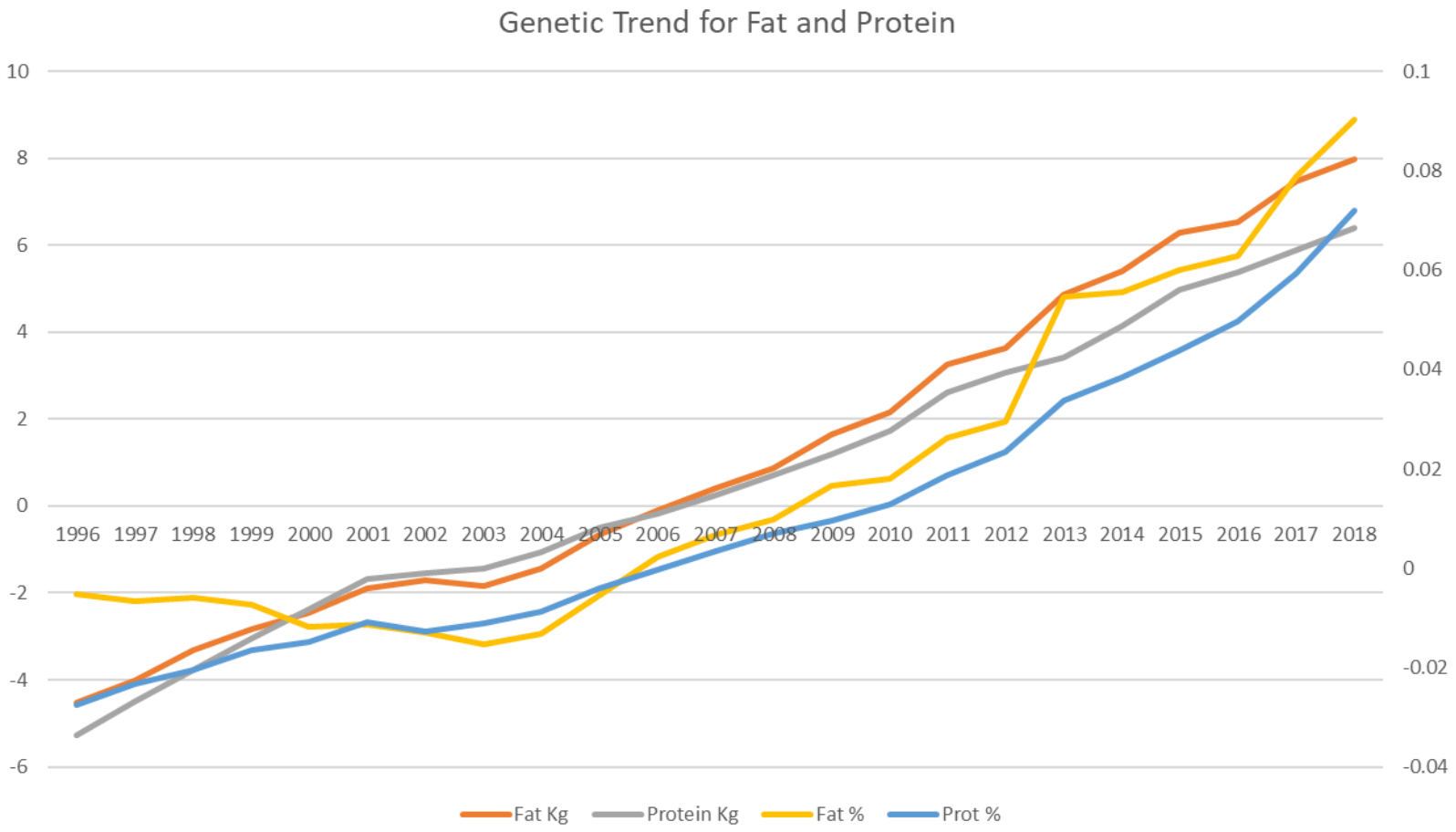
# Genetic Trends



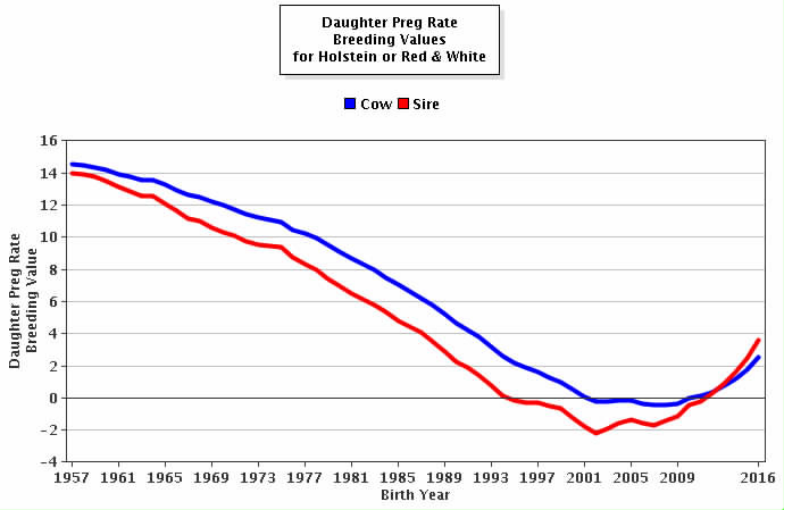
# Phenotypic Trends

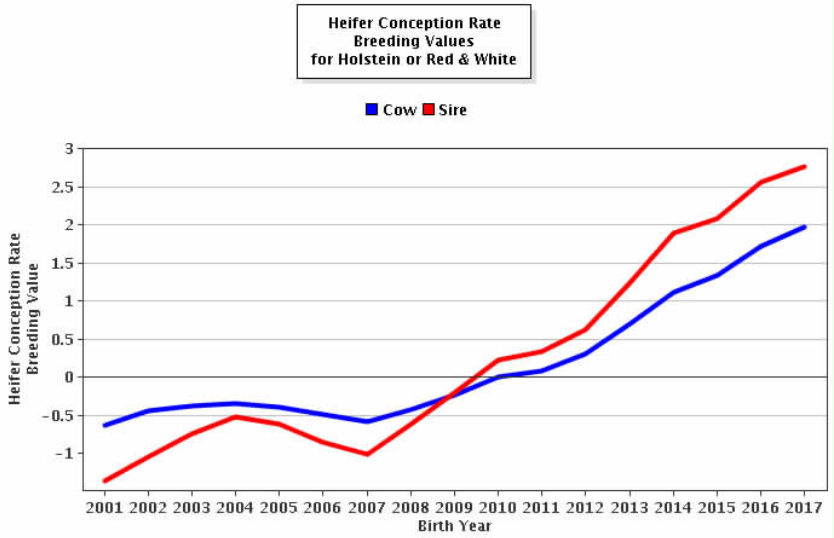


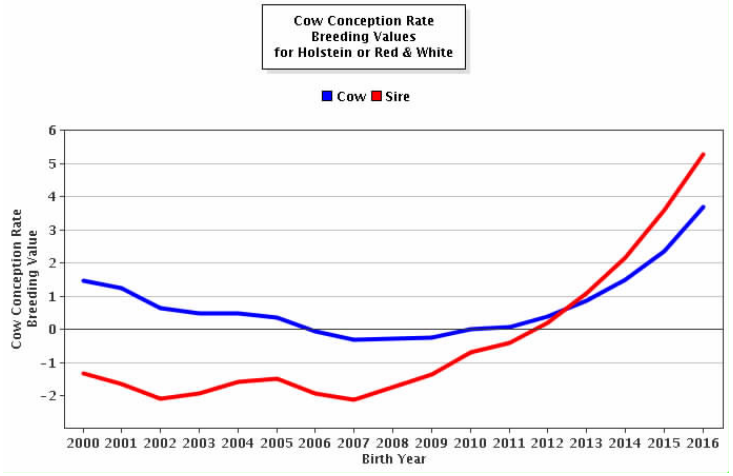
# Genetic Trends

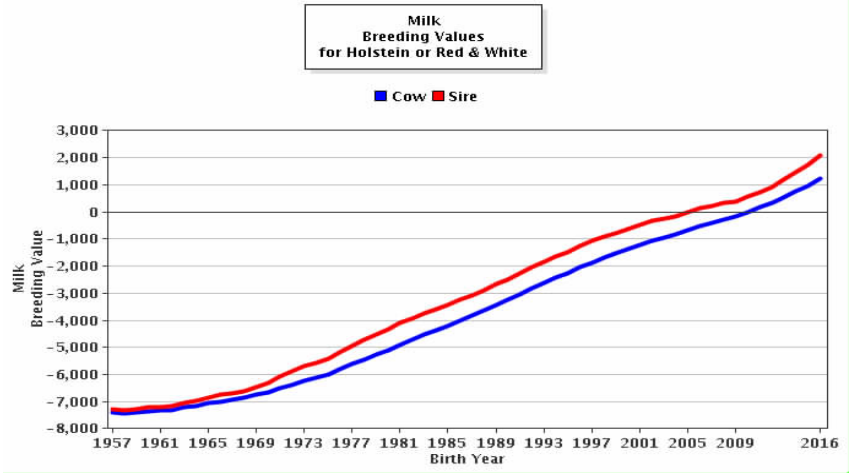


# Trends in Fertility in USA




**Source: CDCB 2018**

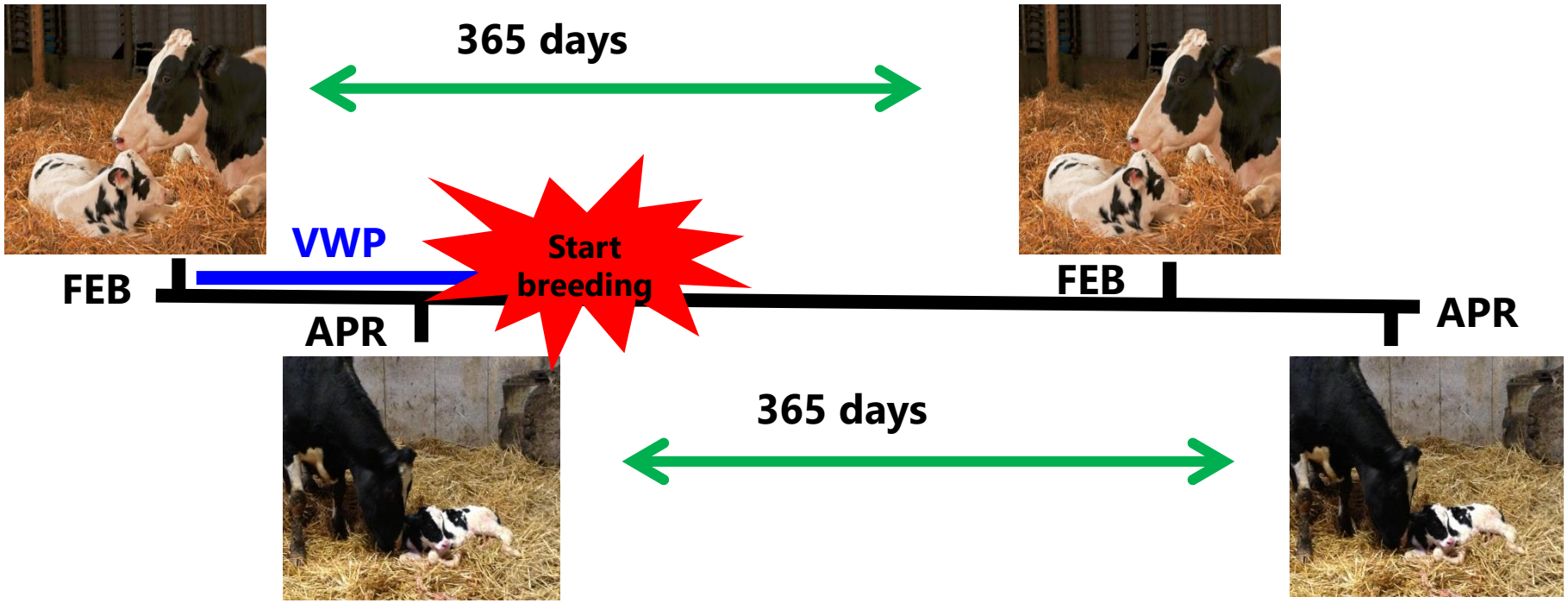
# Current Evaluation

- Current model has done a very good job in reversing the negative genetic trend in fertility
- Genetic trends for production still increasing!
- Complex model based on calving interval but not accounting for compactness of calving

# Current evaluation

## Challenges

- Calving interval does not account for the voluntary waiting period (**VWP**)
- Most fertile cows not rewarded for fertility performance



# Trait definitions

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- CSD – calving season day

  The difference in days between planned start of calving for a contemporary group and actual calving

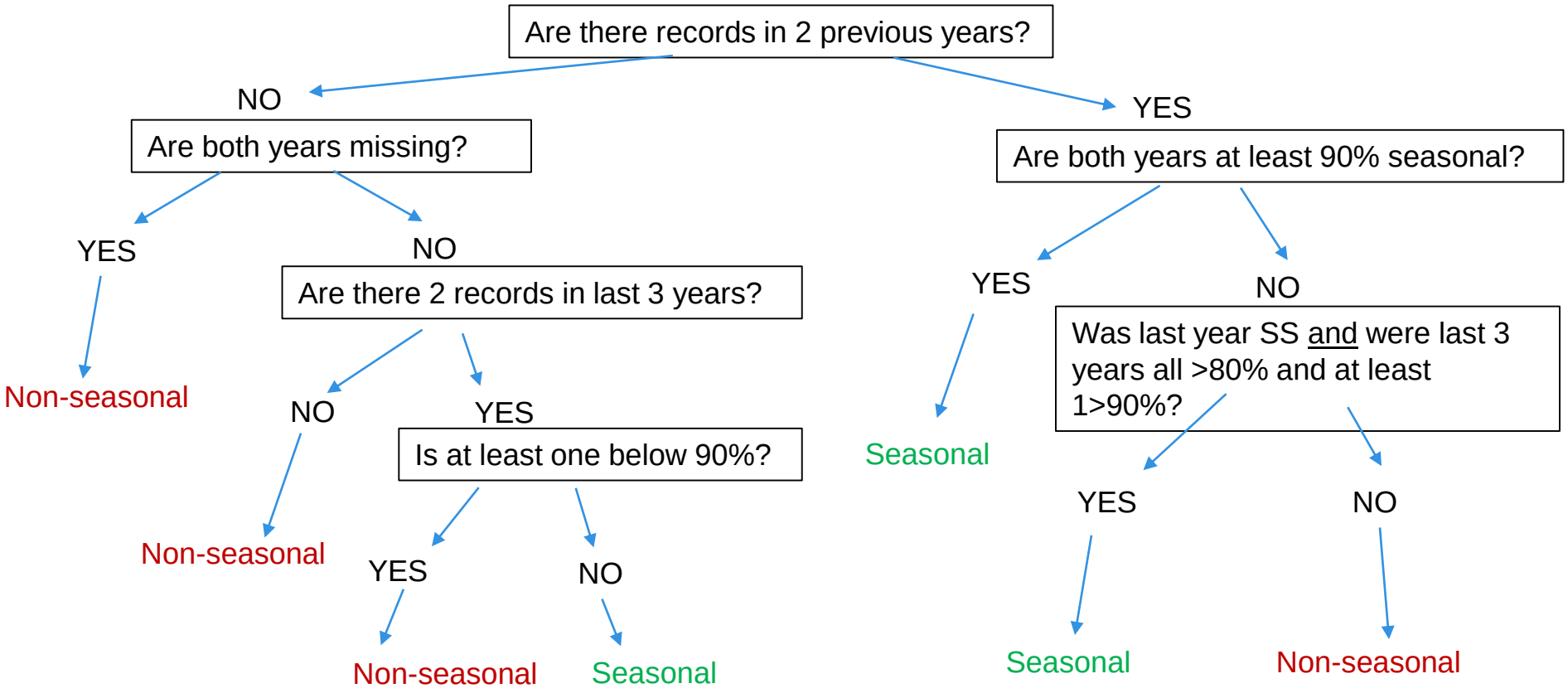
- TCD – time of conception day

  The difference in days between planned start of mating for a contemporary group and the last mating that resulted in pregnancy

- GL- Look at the impact of gestation length on fertility independently

# Seasonal or non-seasonal herd?

ABACUSBIO LIMITED



# Fertility evaluation

ABACUSBIO LIMITED

| | Cow | AFC Age at first calving | CSD Calving season day | TCD Conception day | CINT Calving interval | NS Number of services | SURV Survival | MILK 305d yield |
|---|---|---|---|---|---|---|---|---|
| Seasonal | 101 | x | x | x | | | x | x |
| | 102 | x | x | x | | | x | x |
| | 103 | x | x | x | | | x | x |
| Non-seasonal | 201 | x | | | x | x | x | x |
| | 202 | x | | | x | x | x | x |
| | 203 | x | | | x | x | x | x |

# Future Work

- Continue research on better trait definitions for compactness of calving
- New predictors/traits/genetics markers will become available in time
- Improving genomic predictions for animals
  - Increasing the reference population
  - Single step methodology

# Conclusions

- Clearly not at the limits but genetic selection a key tool to help improve fertility at farm level
- Significant improvements have been made in a relatively short period of time
- Production trends still on an upward trajectory
- Methods to predict EBV will evolve but good quality data essential to maintain favourable genetic trends

ICBF.com

## Our Farmer & Government Representation

Department of Agriculture, Food and the Marine
An Roinn Talmhaíochta, Bia agus Mara

Irish Creamery Milk Suppliers Association

IFA

## Our AI & Milk Recording Organisations

DoveaGENETICS

munster cattle breeding group

PROGRESSIVE GENETICS

TIPPERARY COOP

## Our Herdbooks

AYRSHIRES Cattle Society of Great Britain and Ireland

The Aberdeen-Angus Cattle Society

IBBCS

EASBB

Irish Aubrac

Blonde d'Aquitaine

Irish Charolais Cattle Society

Irish Hereford

IHFA

The Irish Moiled Cattle Society

Irish Limousin Cattle Society

Parthenais

Irish Piemontese Society

Irish Shorthorn Society Ltd.

Simmental

ISP

Droimeson Cattle Society

Ireland's native dairy breed

Montbeliarde

MRI Cattle Society of Ireland
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