



Using Commercial Data and Genomics to Improve Female Fertility and Calf Survival of Limousin beef cattle in the UK

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Introduction



- Fertility evaluations using pedigree data
 - General low uptake of EBVs
 - Low accuracy as late in life, sex limited
 - Terminal V maternal conflict
 - Fertility evaluations changed in 2017
 - National BCMS database
 - Pedigree + commercial + cross bred
 - Genomic selection
- ➔ Increased accuracy

British Cattle Movement Service



COMMERCIAL animals

A screenshot of the CTSonline website. The header includes navigation links: Cymraeg, Accessibility, Privacy, Terms and Conditions, Information for Keepers, and Contact BCMS. The main content area is titled 'Log In' and 'How do I get started?'. It provides a three-step process for registration: 1. Register with the Government Gateway, 2. Enrol for CTS Online, and 3. Log in to CTS Online. It also includes a 'Need help using CTS Online?' section with links to user guides.

British Cattle Movement Service
CTSonline
the easy way to check and report your cattle information

[View Cattle Summary](#)
[Register Births](#)
[Register ON Movements](#)
[Register OFF Movements](#)
[Report Death of a Registered Animal](#)
[Report Death of Unregistered Animal](#)
[View Animal Details and History](#)
[Uploads and Downloads](#)
[Problem Summary](#)

BCMS Accessibility
BCMS Privacy
BCMS Terms and Conditions
Information for Keepers
Contact BCMS
Holding Enrolments

SPS 2013 – Apply online now!

Join over 42,000 farmers who have already found how quick and easy it is to submit their Single Payment Scheme (SPS) applications online. If you already use CTS Online, why not try SPS Online? You'll benefit from an automatic check for common errors, an instant online receipt and the facility to track your claim online at any time. You don't need super fast broadband and getting started couldn't be easier – all you need is your SBI and the PIN number we have sent you. Visit gov.uk/single-payment-scheme-online and select 'Start now'. It really is that easy. If you have any questions, call us on 0845 603 7777 and we'll help you to get started.

[Manage your Single Payment Scheme online](#)

Tip of the Week

Is information on your cattle passport incorrect? If any information shown on your cattle passport is incorrect, please return it to us. You must either write the changes clearly on the passport or include a covering letter showing the changes to be made. You cannot move the animal until you receive a corrected passport.

Need help using CTS Online?

We have created user guides to help guide you through the registration and enrolment process and some of the more advanced functions e.g. How to report movements of cattle ON & OFF show premises on the same day.

To view the user guides, click [here](#)

How do I get started?

Preparing to use CTS Online is a three step process. You will only need to go through the first two steps once.

1. Register with the Government Gateway
2. Enrol for CTS Online
3. Log in to CTS Online

1. If you do not have a Government Gateway User ID, you will need to register for Government Gateway before you can enrol for CTS Online. For instructions on how to Register for Government Gateway follow the [Registration and Enrolment Process](#)
2. If you have not yet enrolled to the BCMS CTS Online service you will need to do so. You will need your CPH number and CTS Online ID to enrol for the service. For instructions on how to enrol for the BCMS CTS Online service, follow the [Registration and Enrolment Process](#)
3. If you have successfully enrolled for the BCMS CTS Online service, click the "Log in" button to access the service. You will need your Government Gateway User ID and password to login.

- Information:
 - Dam
 - Breed
 - Date of birth
 - Date of death
 - Movement

- Not compulsory:
 - Sire

Fertility and Survival GEBVs

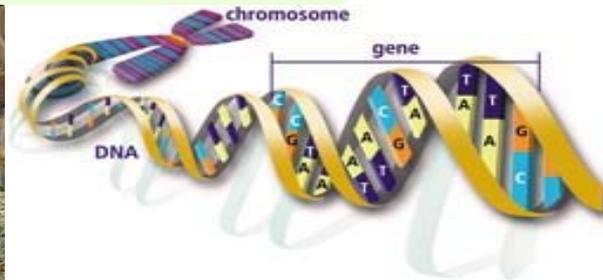


SRUC



LIMOUSIN

- 1 year project (2016-2017)
- Limousin genomic breeding values for female fertility and calf survival traits
- GEBVs implemented July 2017



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VIA carcass traits GEBVs

- 4 year project (2012-2015)
- Limousin genomic breeding values for abattoir VIA carcass traits
- First UK GEBVs March 2016



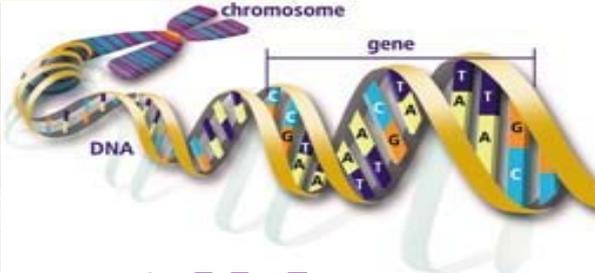
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LIMOUSIN



Food Group

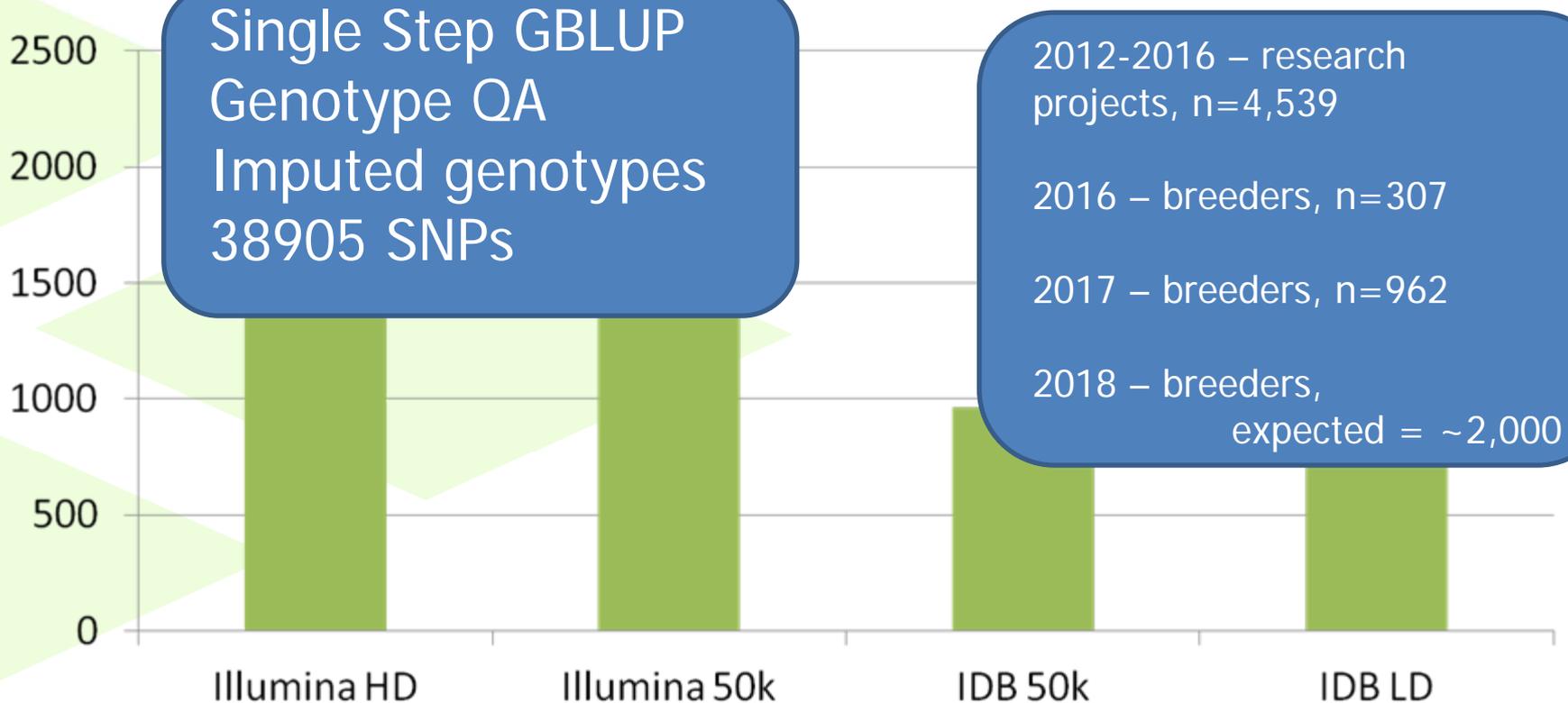


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Genotypes (n=5,808)



Female Fertility and Calf Survival



- Using national records (BCMS)
- ~12 million animal records (45%+Limousin)
- Restricted to 2003+ and applied some basic data edits
 - ~8 million records
 - ~ 1/2 million cows with fertility records



Female Fertility and Calf Survival



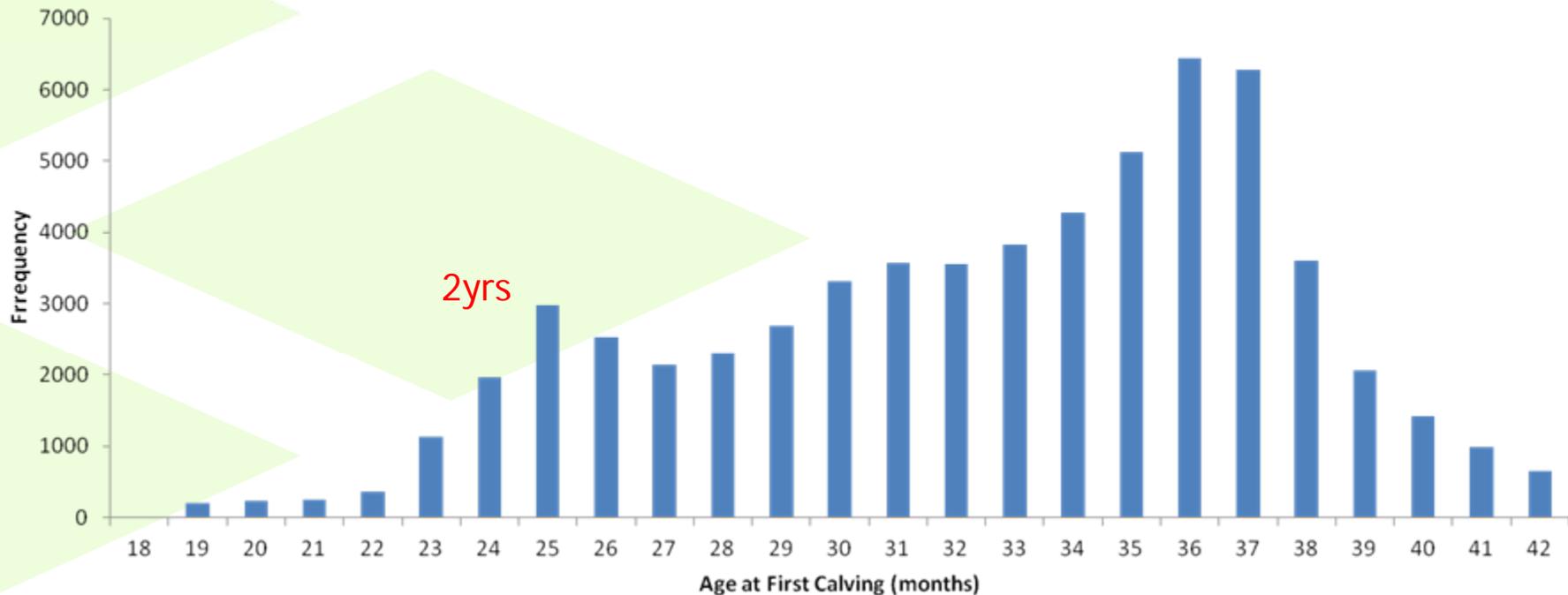
- Age at first calf
 - 548 & 1460 days (18-48m)
- Lifespan
 - number of parities when aged 6.5 years
- Calving interval
 - days between 1st and 2nd calf
- Calf survival
 - to 10 months, 1=died, 2=survived



Age at First Calf



Distribution of Age at First Calving 3yrs

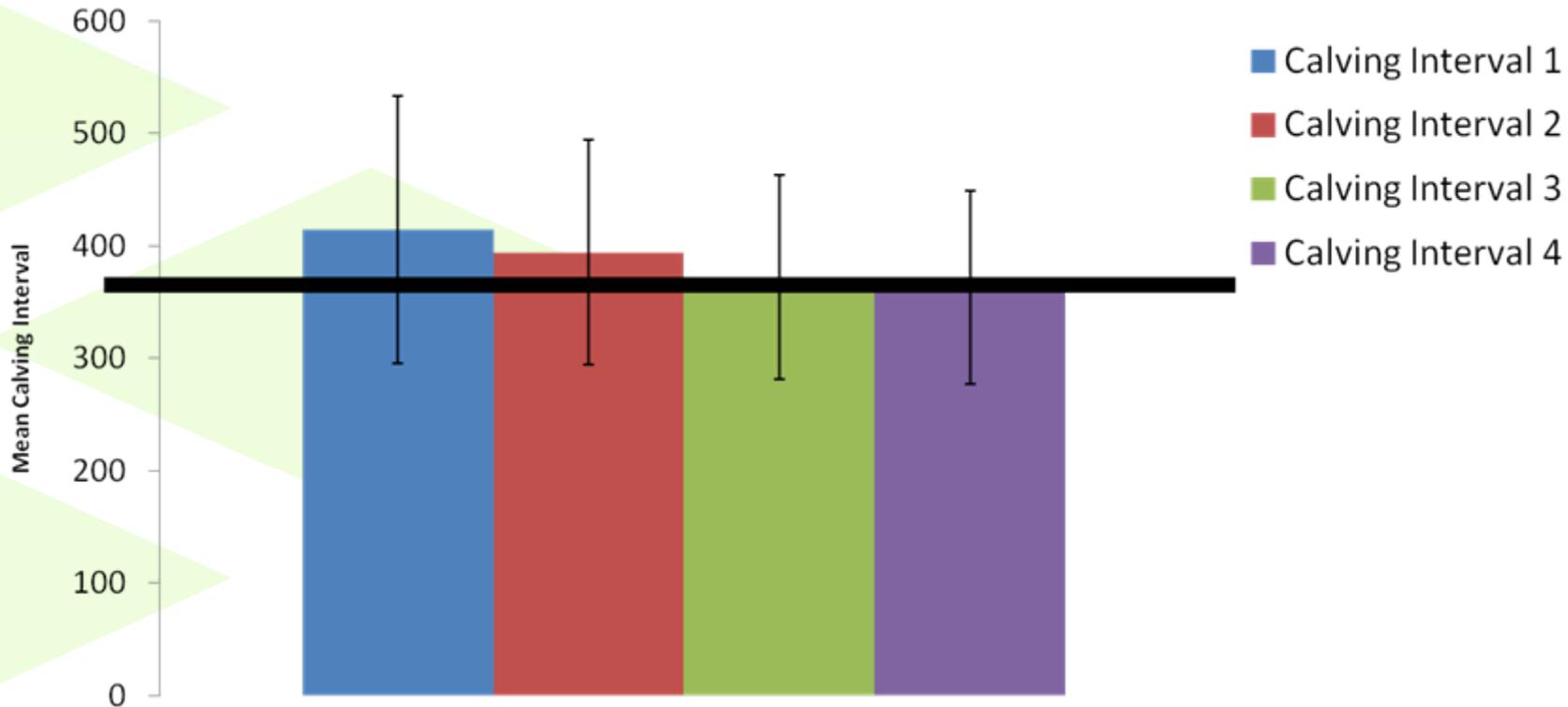


Lifespan



Number parities	Number cows	Average dam age (years)	Percentage of all dams	Percent of dams from previous parity
1	559,832	2.6	100.0	-
2	435,001	3.8	77.7	77.7
3	341,358	4.9	61.0	78.5
4	263,169	6.0	47.0	77.1
5	196,876	7.0	35.2	74.8

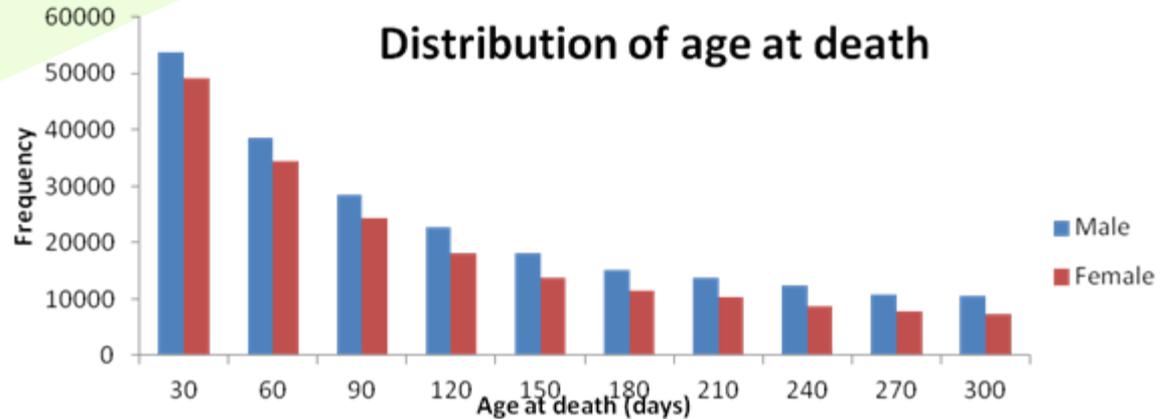
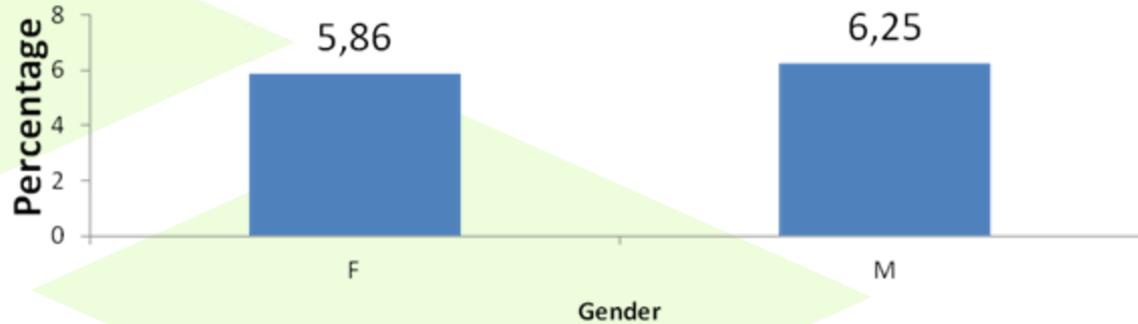
Calving interval



Calf Survival



Percentage of males and females died



Genetic Parameter Estimation



- Further data edits
 - Ensure reproductive life complete
 - Known sire or maternal grandsire
 - Trait specific edits

	CG	DAM PARITY	CALVING MONTH	SEX	HET/REC	AFC (l & q)	DAM AGE	ANIMAL
AFC	X	X			X			X
CI	X		X		X	X		X
LS	X				X	X		X
CS	X	X		X	X		X	X

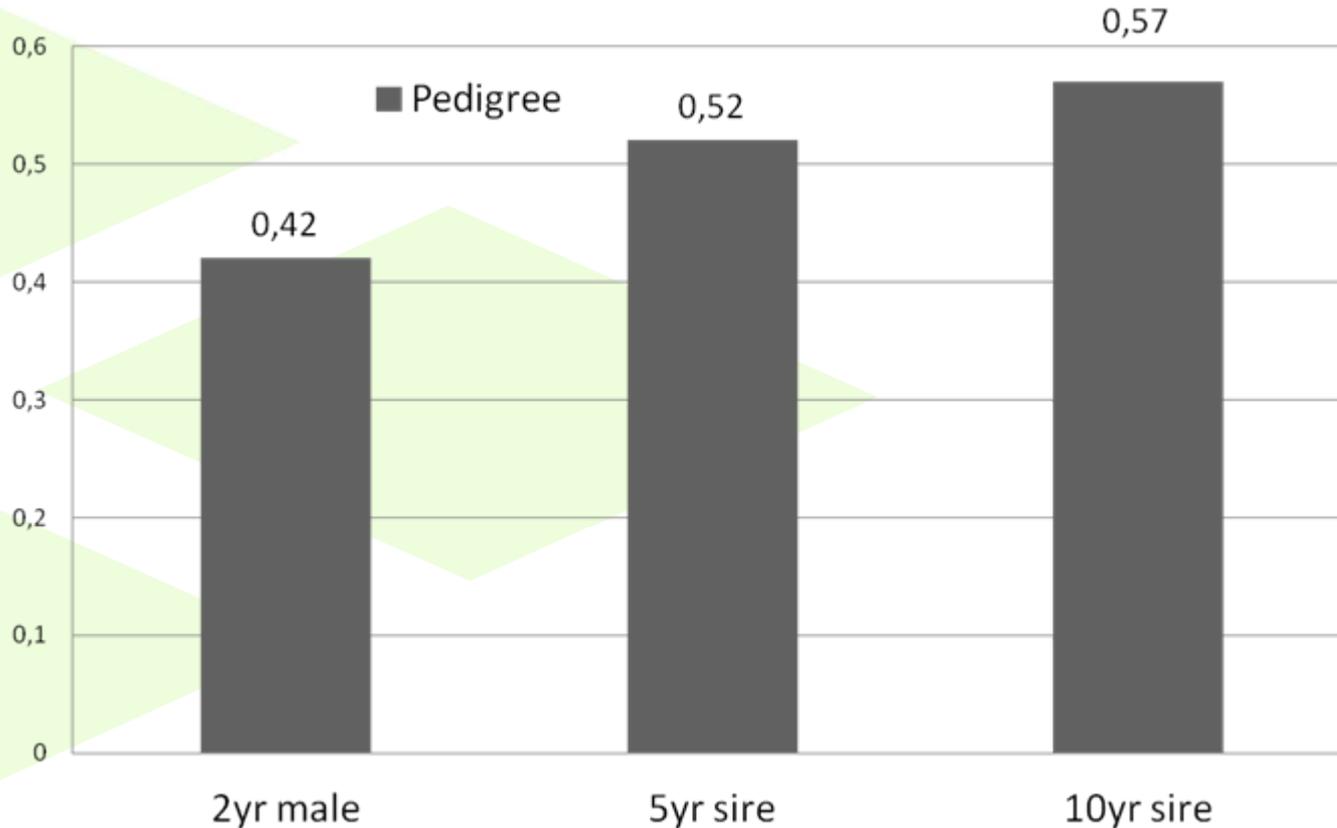
Genetic parameter estimates (SE)



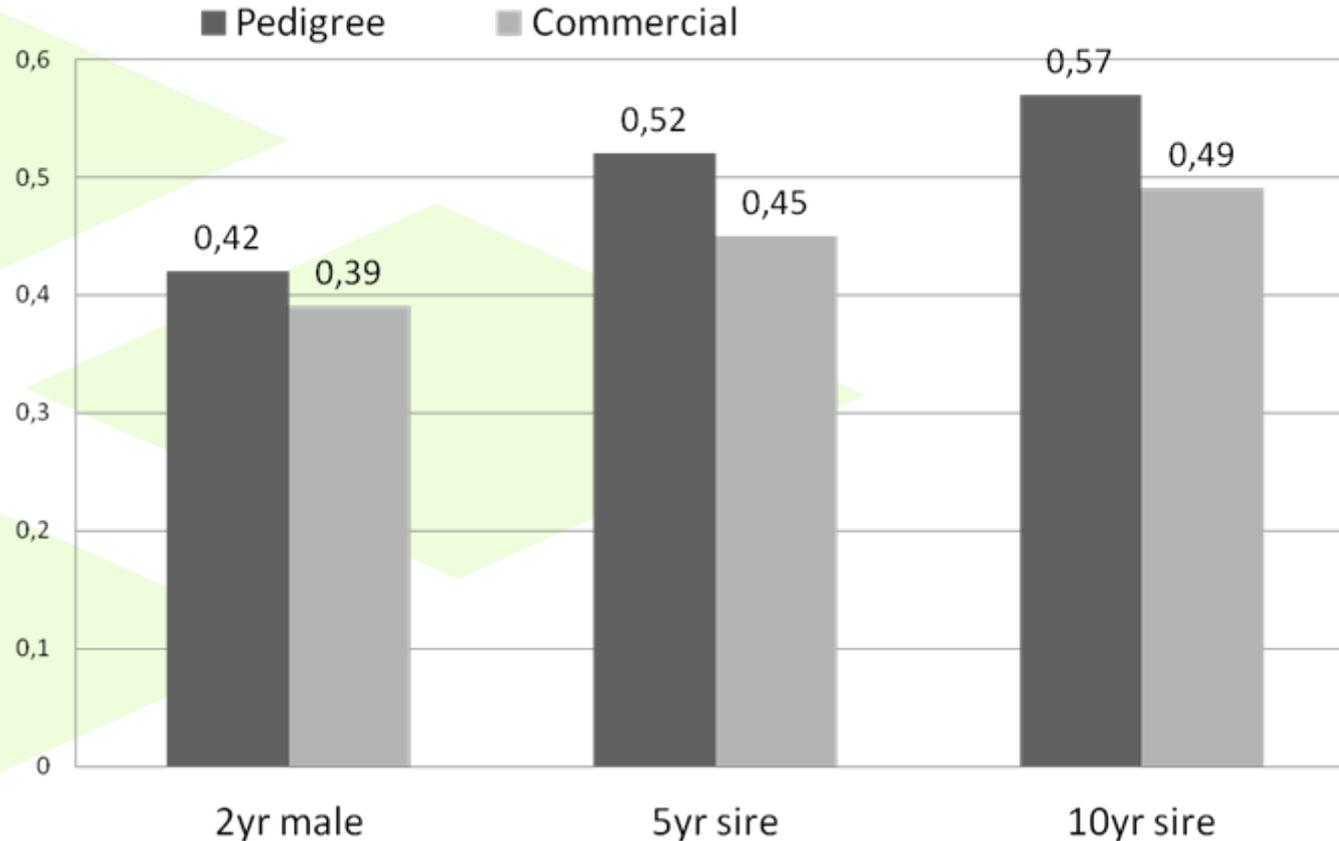
Heritability on diagonal, genetic correlation above, phenotypic below

Trait	Number	Vp	Age at 1 st calf	Calving interval	lifespan	Calf survival
AFC	58,148	15057 (99.40)	0.13 (0.01)	-0.04 (0.18)	-0.03 (0.14)	-
CI	27,861	10448 (96.05)	-0.03 (0.01)	0.05 (0.02)	-0.46 (0.19)	-
LS	34,307	1.19 (0.01)	0.01 (0.01)	-0.30 (0.01)	0.05 (0.01)	-
CS	55,149	0.075 (0.001)	-	-	-	0.04 (0.01)

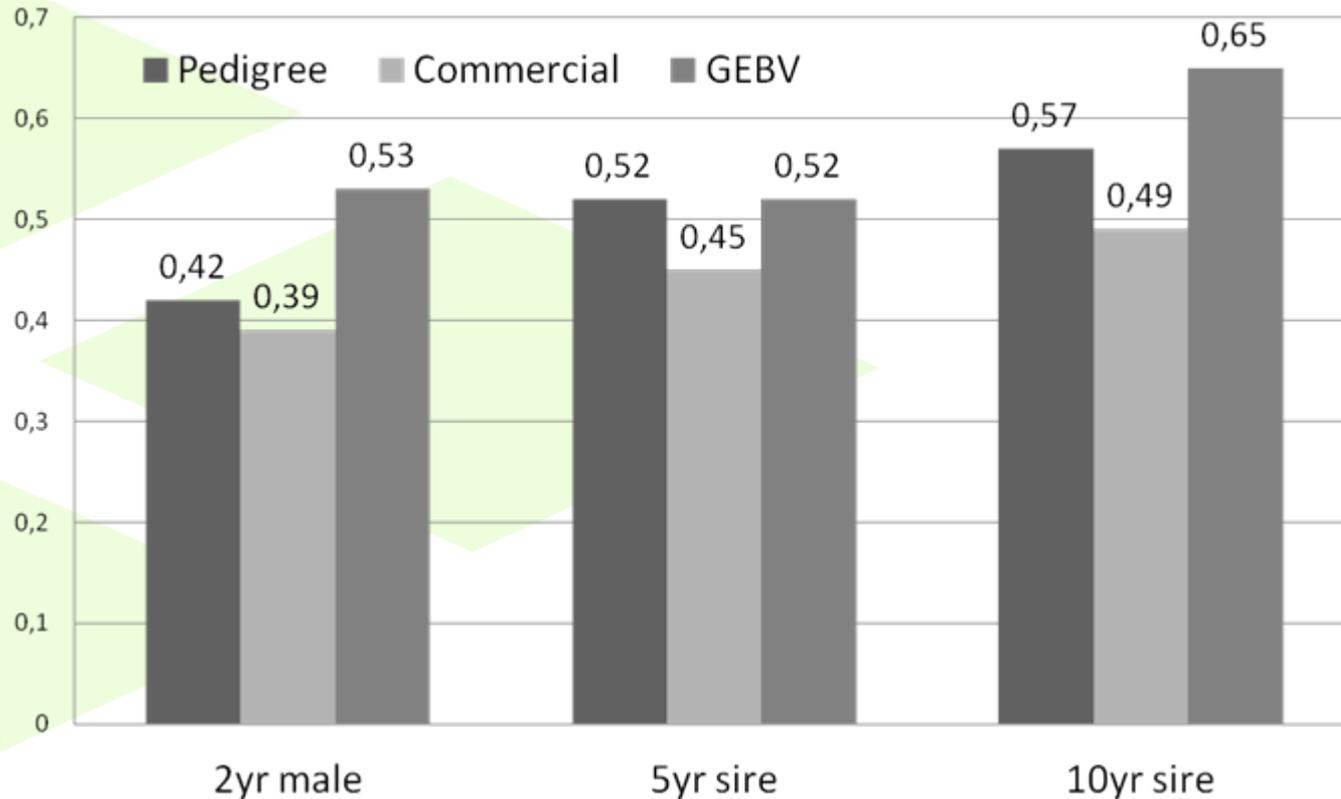
Average accuracy for Age at first calf



Average accuracy for Age at first calf

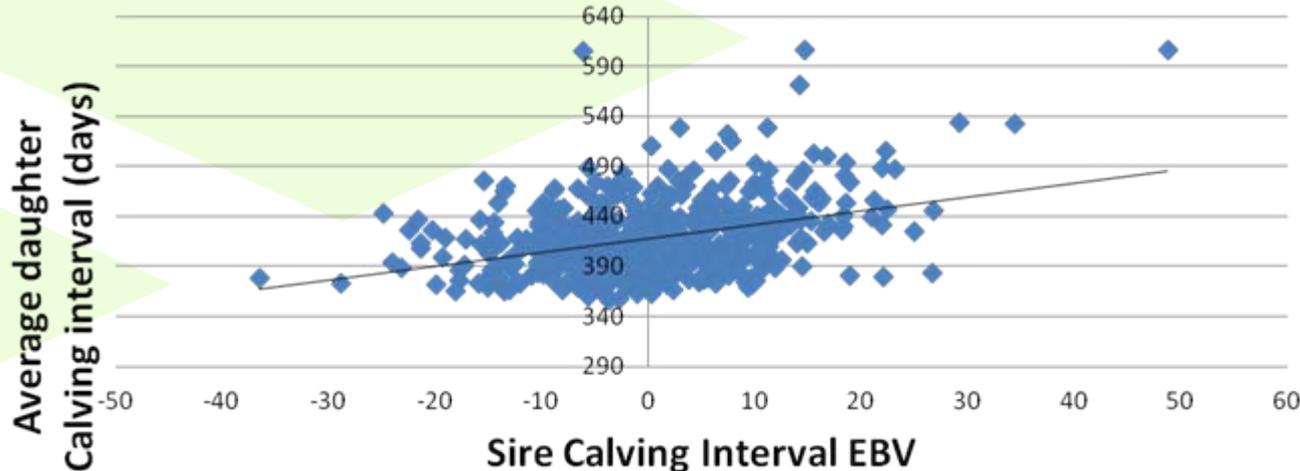


Average accuracy for Age at first calf



Sire EBV v Progeny performance

- Sires 50%+ accuracy & 10+ daughters
- Correlations ranged 0.19 (AFC) to 0.43 (CS)
- Regressions ranged 0.96 (AFC) to 1.38 (CI)



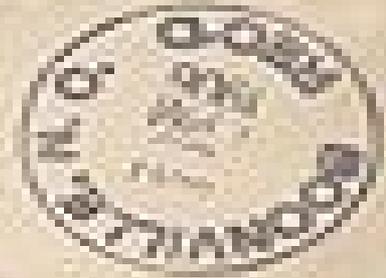
Relationship with existing fertility EBVs



- One set of (G)EBVs published
- Large amounts of new data, new trait definitions, genomic element
- Animals with accuracy 50%+ in both evaluations
 - AFC, $r=0.33$
 - CI, $r=0.33$
 - LS, $r=0.43$

1 extra calf?

- 1.6 million beef cows
 - 31% sired by Limousin
- 496,000 extra calves
 - 300 kg carcass and 84% weaning rate
 - 125,000 tonnes of beef
 - 15% of current production
 - Same size national herd
 - Reduction of greenhouse gas emissions
 - 537 – 578, 000 tonnes of CO₂e (Navajas *et al.*, 2008)



Thank you

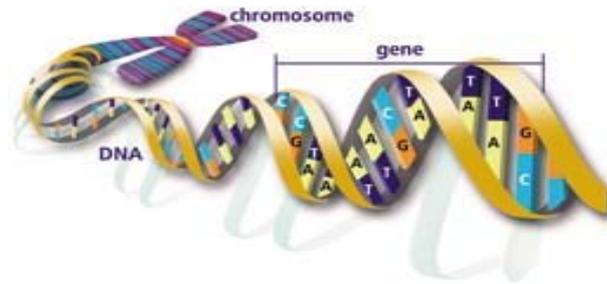


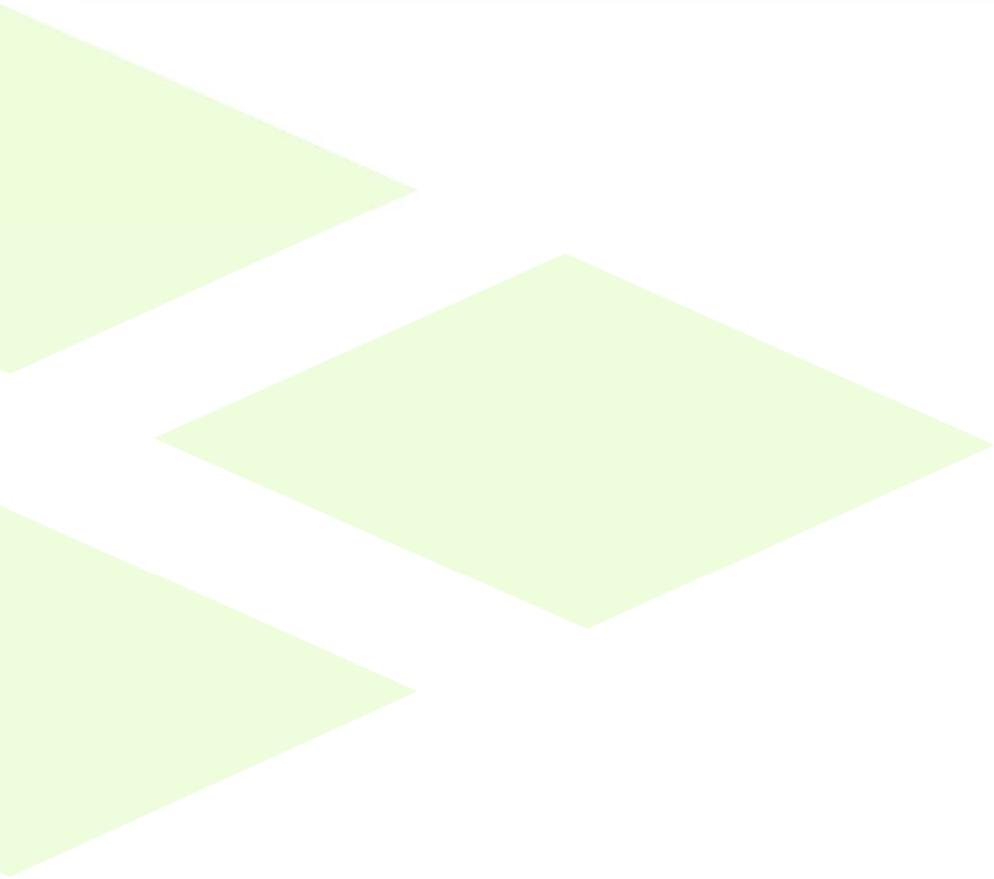
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Genetic parameter estimation



- CG – herd and season (6 month slice)
- AFC and CS CG
 - Animals
- CI and LS CG
 - 1st calf
- Further edits
 - Reproductive life completed
 - Sire or maternal grand sire known
- 3 generation pedigree
- ASReml for parameter estimation
- Trait specific edits
 - Age at First Calf (AFC)
 - 548 and 1,460 days
 - Calf not the result of ET
 - AFC within 3 SD of CG mean
 - Not a single sire or small (<5) CG
 - Calving interval (CI)
 - Valid AFC, 270 – 913 days, penalty applied if greater than 913days
 - CI within 3 SD of CG mean
 - Not a single sire or small (<5) CG
 - Lifespan (LS)
 - Valid AFC
 - Not a single sire or small (<5) CG
 - Calf Survival (CS)
 - Multiple births
 - Death rate < 2% within a CG
 - CS within 3 SD of population mean for each sex
 - Not a single sire or small (<5) CG
 - 2007-2009 born animals

Relationship with VIA carcass GEBVs



N=4,025	AFC	CI	LS	CS
Carcass Wt	-0.002	-0.03	0.03	-0.05
Slaughter Age	0.03	0.01	0.02	-0.03
Fillet	0.11	0.16	-0.22	-0.10
Conformation	0.19	0.04	-0.08	-0.04
Fat	-0.09	-0.23	0.18	-0.06