CHANGES TO THE GENETIC EVALUATION OF FERTILITY IN IRISH DAIRY CATTLE

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Cow fertility in Ireland

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- Current genetic evaluation is a joint fertility and survival model with 23-traits included

- Calving interval is utilized as primary fertility trait

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Seasonal and non-seasonal herds

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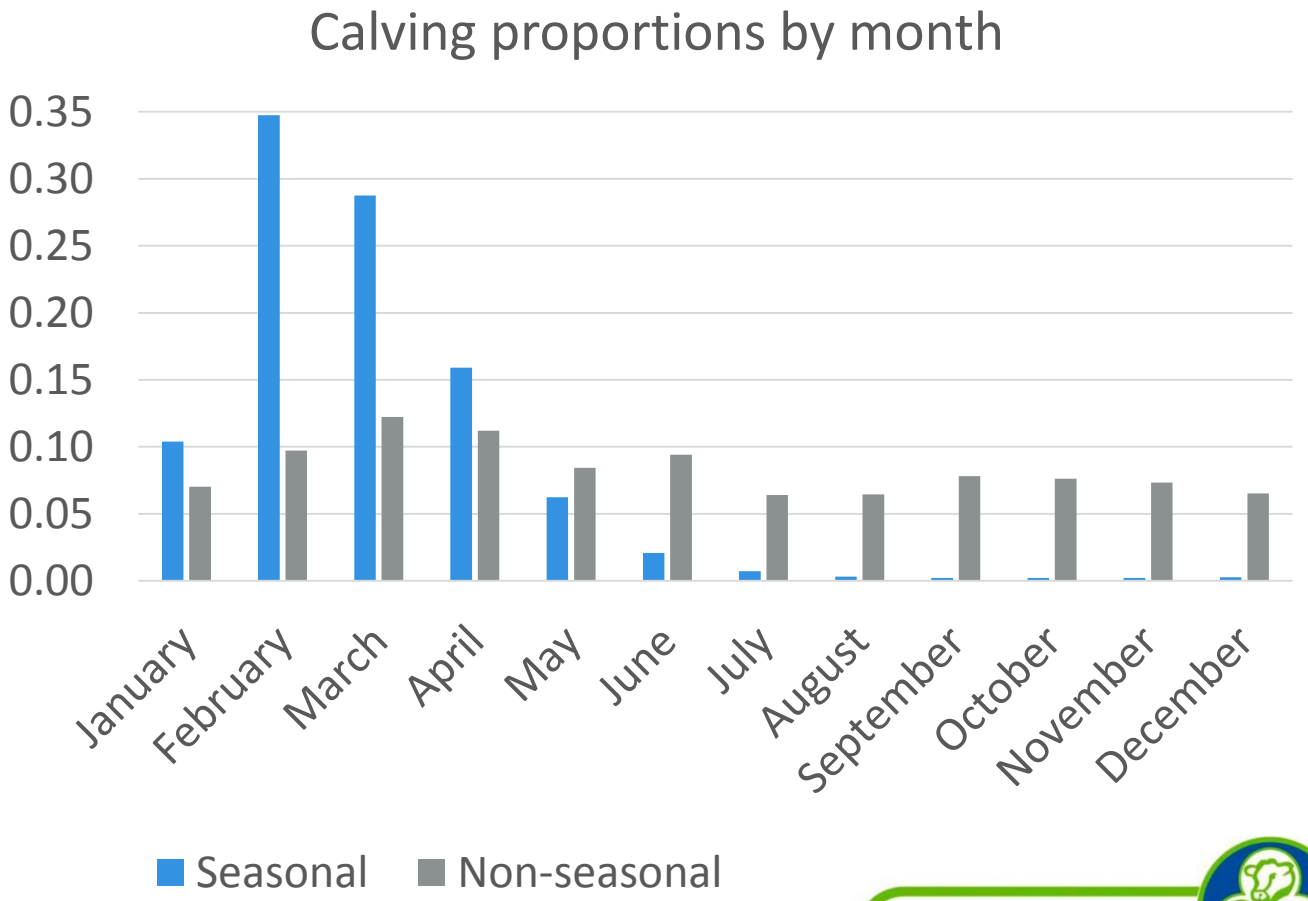
- Around 75% of herds are displaying seasonal calving patterns and the trend is increasing
- Seasonal calving is when majority of calvings happen in the spring



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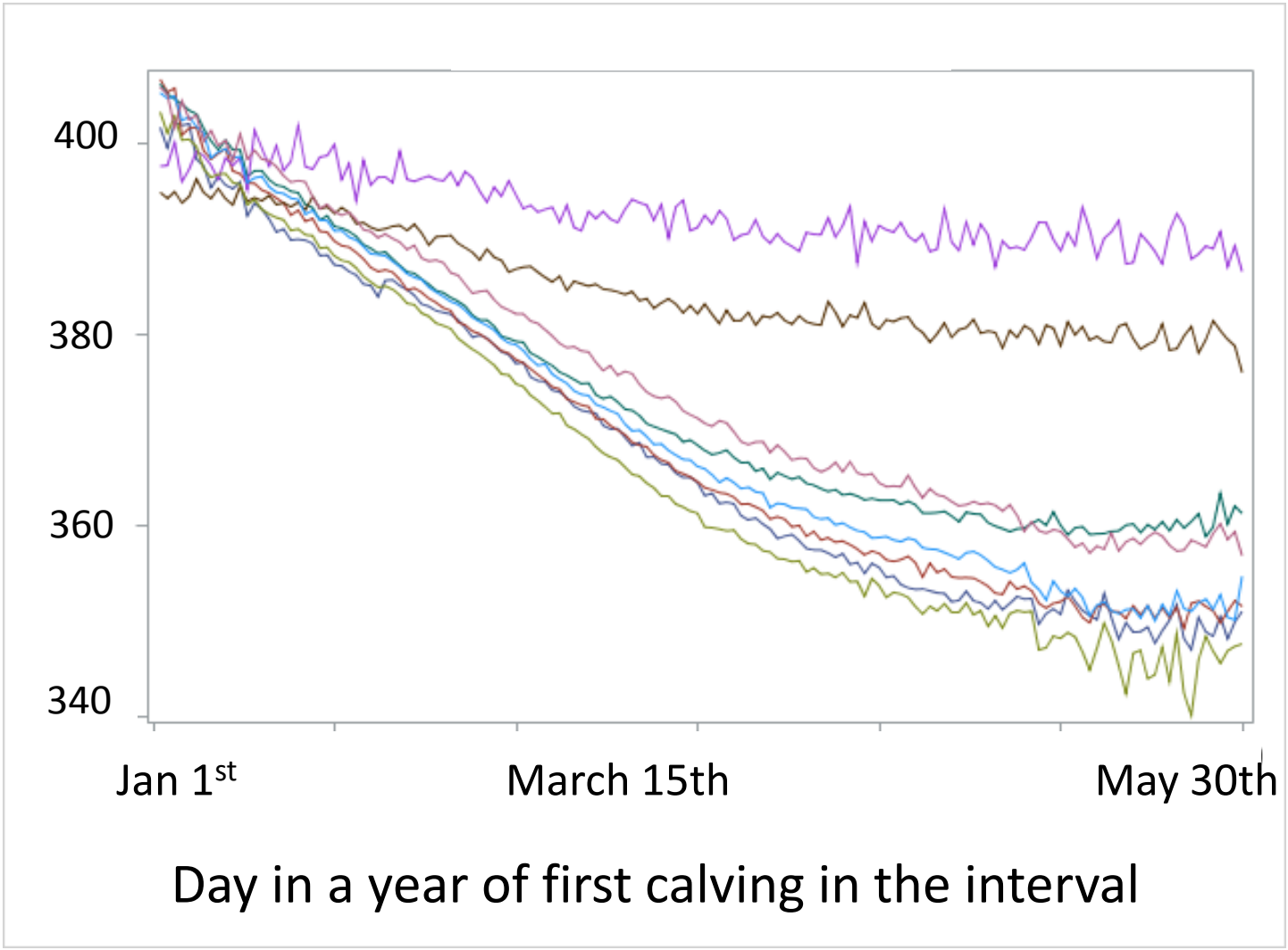
Calving interval



All year round

Split calving

Relaxed seasonal herd definitions

Strict seasonal herd definitions

Objectives

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- To assess the feasibility and benefits of defining more seasonally oriented fertility phenotypes for seasonal herds

- Evaluate a prototype genetic evaluation system that would incorporate both seasonal and non-seasonal fertility phenotypes

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Seasonal or non-seasonal herd?

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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

Traits

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	Seasonal (strict)		Seasonal (less strict)		Non-seasonal	
	Heritability	Repeatability	Heritability	Repeatability	Heritability	Repeatability
AFC Age at first calving	0.088		0.144		0.212	
CINT Calving interval	0.005	0.005	0.014	0.015	0.051	0.085
CSD Calving season day	0.038	0.276				
TCD Conception day	0.038	0.158				

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Genetic correlations between seasonal and non-seasonal herds for:

* AFC = 0.664

* CINT = 0.677

Fertility evaluation

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

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Fertility evaluation

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	202	x			x	x
	203	x			x	x

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Fertility evaluation

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Fertility evaluation

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Non-seasonal	201	x			x	x
	202	x			x	x
	203	x			x	x

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Model

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- AFC = julday + cg + breed + het + rec + animal + e
- CSD = age + age^2 + cg + breed + het + rec + animal + pe + e
- TCD = age + age^2 + cg + mating_type + breed + het + rec + animal + pe + e
- CINT = age + age^2 + cg + cmonth + breed + het + rec + animal + pe + e
- NS = age + age^2 + cg + mating_type + breed + het + rec + animal + pe + e

julday – Julian day of the year of date of birth
mating_type – type of first and last mating (AI or natural service)
cmonth – month of calving
cg – herd-year in seasonal herds, herd-year-season in non-seasonal herds
AFC – age at first calving; CSD – calving season day; TCD – time of conception day;
CINT – calving interval; NS – number of services

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Variance components

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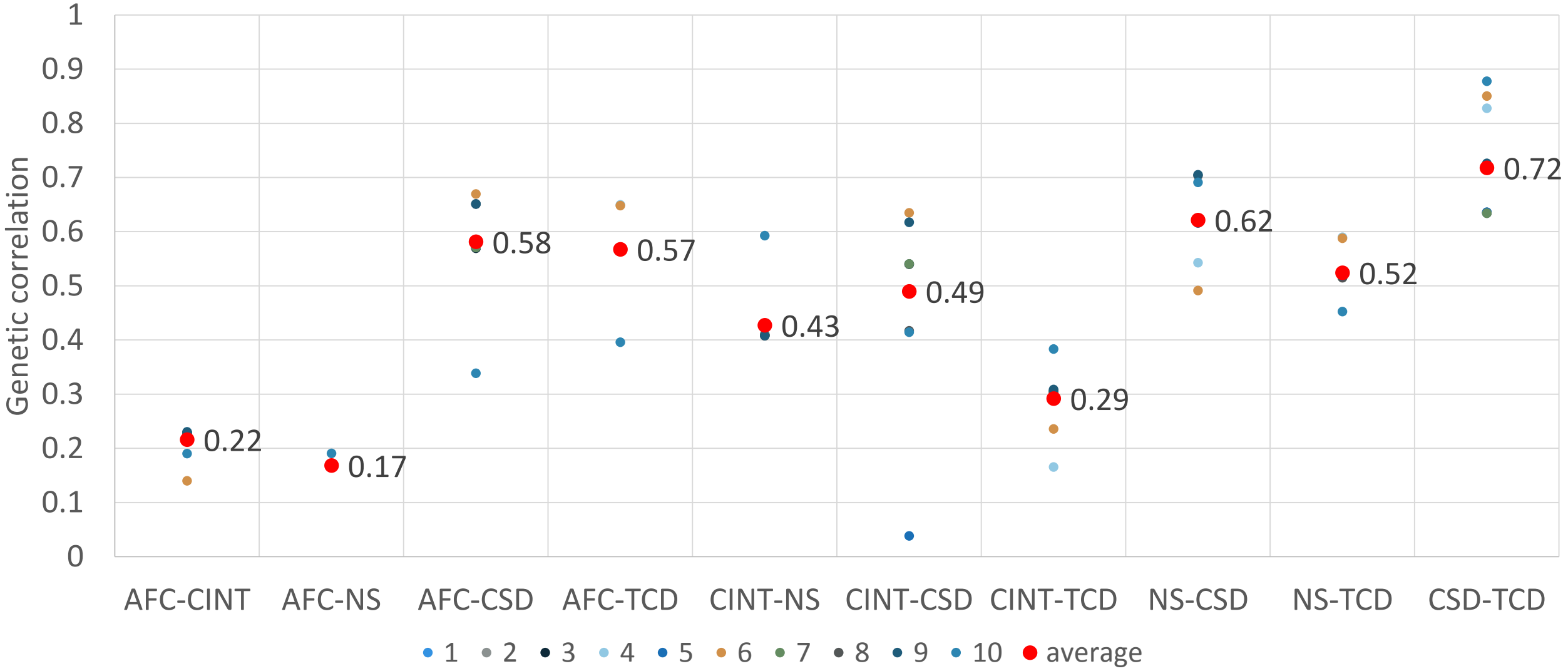

Genetic evaluation

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- Correlations between average daughter phenotypes and current/new EBVs

All data	Current CINT EBVs	New CINT EBVs	New CSD EBVs
CINT - All data	0.26	0.36	0.25
CSD – All data	0.29	0.30	0.33

2017 data excluded	Current CINT EBVs	New CINT EBVs	New CSD EBVs
CINT - Roll-back data	0.22	0.20	0.21
CSD – Roll-back data	0.15	0.15	0.20

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Genetic trends

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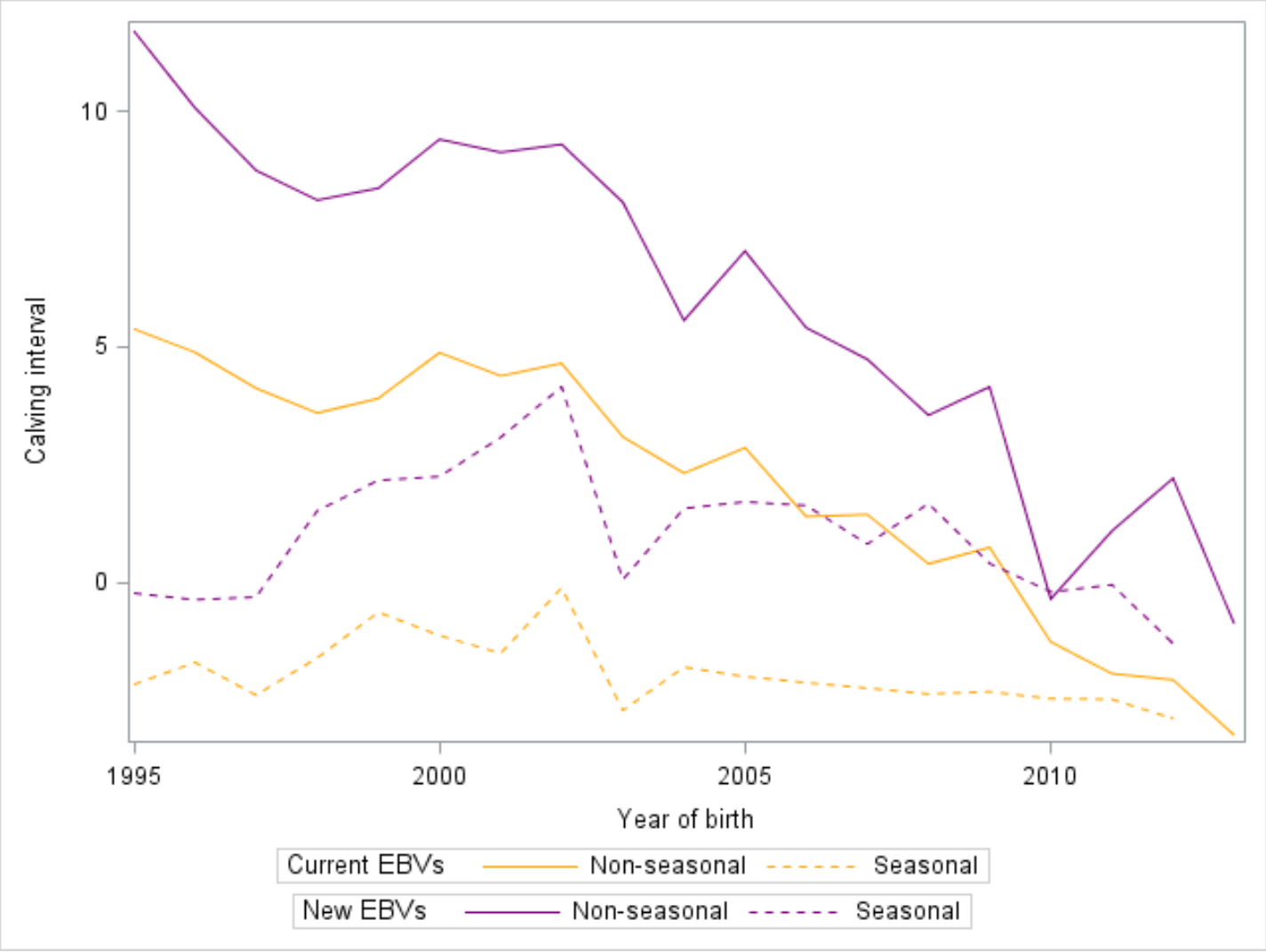

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Conclusions

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- Strict seasonality of calving is increasing and a key driver for low cost dairy production
- Use of calving interval has delivered strong favourable genetic trends for fertility in Ireland
- For seasonal herds, calving rate and conception rate traits offer opportunity to enhance fertility evaluation
- Validation indicates that the prototype model is improving predictions of genetic merit of fertility for seasonal calving herds

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Thank you!

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