

Sustainable dairying with efficient and effective breeding programs for improved health and fertility

Siobhan Ring¹, Donagh Berry² and Margaret Kelleher¹

¹Irish Cattle Breeding Federation, Shinagh House, Bandon, Co. Cork; ²Teagasc, Animal & Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork

Summary

- Genetics creates the potential, management realises the potential, reproductive failure and disease destroys the potential.
- Breeding for improved reproductive performance has delivered, but more has yet to be achieved.
- Breeding for improved health status will, like the successes in fertility, deliver improved national health status.

Understanding genetic evaluations

Genetic evaluations for fertility have been available on all dairy cattle since 2001; genetic evaluations for somatic cell count and later mastitis and lameness have also been available for over 10 years. Genetic evaluations for TB and liver-fluke are now available. Each bull and cow receive a genetic proof (often referred to as a predicted transmitting ability; PTA) for calving interval as a measure of fertility. The more negative the calving interval PTA the more desirable it is; a calving interval PTA of -6 days implies that the female progeny of that animal, when producing in the average Irish herd, are expected to have a calving interval six days shorter than an average historical cow (referred to as the base population); the base population calving interval is currently 400 days.

1. EBI Herd Summary

Average EBI for all dairy cows with; (i) a known sire (or milk recorded progeny with a known sire) and (ii) are currently on your farm.

Group	Num of Cows	M Kg	F Kg	F %	Surv %	Milk Solids % Contrib	Fertility % Contrib	Calving % Contrib	Beef % Contrib	Health % Contrib	EBI €
		P Kg	P %	P %	CI Days						
Overall Cows	607	143	8.6	0.06	1.4	€49.4	€39.4	€16.1	€-5.9	€-1.3	€98
			7.4	0.05	-2.0	44.1%	35.1%	14.4%	-5.3%	-1.2%	
1st Lactation	196	169	10.1	0.07	1.3	€55.7	€38.9	€19.9	€-6.6	€-1.7	€106
			8.4	0.05	-2.0	45.4%	31.7%	16.2%	-5.4%	-1.4%	

Bull

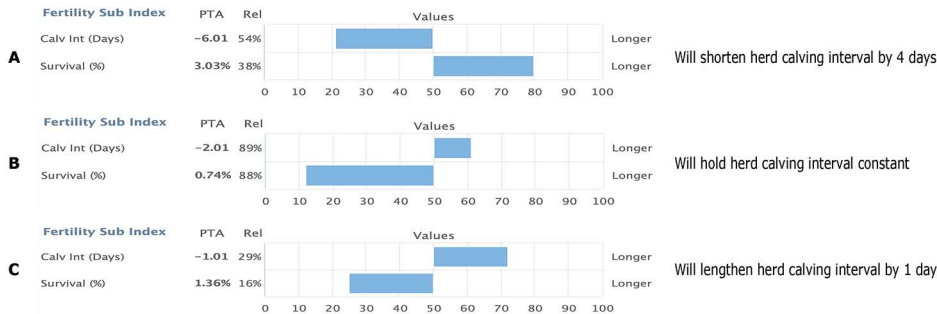


Figure 1. Expected impact of using bull A, B, or C on the calving interval of the herd

Every herd is different, however, and the best way to determine if a team of bulls will improve the fertility in your herd is to compare the average calving interval PTAs of the cows in your herd with the average of the team of bulls. If the average calving interval of the team of bulls is more negative than your herd, then the resulting progeny are expected

to be genetically more fertile than the current herd of cows. This is clearly depicted in Figure 1; the calving interval PTA of the herd is -2 days. Hence a bull that is more negative than -2 (i.e. bull A) will reduce the calving interval; the number of days the bull is expected to reduce the calving interval by is the difference between the mean of the herd and that of the bull (i.e. $-6 - (-2) = -4$ a four day shortening in calving interval).

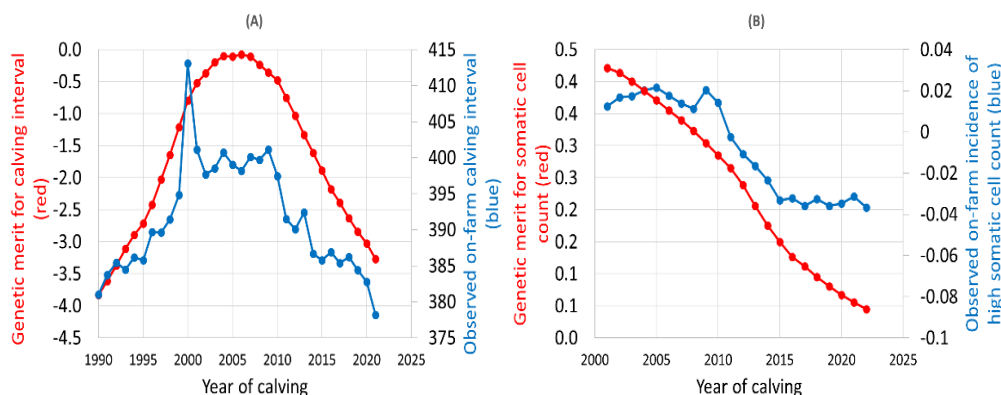


Figure 2. Genetic and observed trends for (A) calving interval and (B) somatic cell count for Irish cows

A lot done...

Breeding programs for improved calving interval have clearly delivered. Figure 2 demonstrates how the observed calving interval on farm closely tracks the genetic merit of the same cows for calving interval; the same is true for somatic cell count (Figure 2). This, therefore, clearly illustrates how using bull teams with good genetic merit will deliver a more fertile and healthy herd.

... a lot more to do

A new fertility genetic evaluation model is currently being researched. While the current fertility genetic evaluations have delivered (Figure 2), a greater proportion of herds are calving cows in a more strictly seasonal pattern. Historically accounting for the voluntary waiting period post-calving was not necessary, but now cows calving earlier in the calving season are currently being disadvantaged, as their calving interval record are longer, due to management rather than fertility. Furthermore, some of the improvement in calving interval was due to shortening of gestation length, which does not reflect conception. The new research model proposes to improve the calving interval and survival genetic evaluation model by accounting for voluntary waiting period but also by supplementing these with a 6-week in-calf trait.

Conclusion

Cow fertility continues to improve, albeit room for improvement still exists for many herds; therefore, selection pressure on using high fertility bulls needs to continue. Genetic evaluations for a range of health traits now exist; the improvements observed in fertility performance over the last few decades can also be realised for animal health.