

Decision support tools: what your data can do for you

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Summary

- Three new complementary on-farm decision support tools have recently been developed:
 - » Cow's Own Worth (C.O.W) to assist with culling decisions.
 - » Sire Advice for mating decisions support.
 - » BLUE to evaluate farm-specific tailored breeding programs.

Introduction

Animal performance is a function of both the animal's DNA and the environment and management the animal is exposed to. While the genetic contribution to performance is captured within the EBI, other factors that affect performance have been largely ignored. The growing number and quality of available data sources in agriculture provide opportunities to develop value-creating tools to aid decision making on-farm.

Cow's Own Worth (C.O.W)

The C.O.W. decision support tool supports culling decisions. C.O.W. ranks females, within a given herd, based on each cow's expected remaining lifetime profitability taking into account factors such as age, level of heterosis, and calving date as well as the genetic merit of both the female herself and her future expected female progeny. The index considers a cow's expected profit from the current lactation, expected profit from her projected future lactations, and the net cost of replacing her with a heifer. The C.O.W. is generated using all available data at the time of execution, thus always exploiting the most up-to-date information. Farmers are encouraged to input all data such as health events and pregnancy diagnosis. Use of the index when making culling decisions increases profit on-farm. Since the launch of C.O.W. in 2017, >1,330 farmers have run the application for their farm.

Sire Advice

Sire advice is an online decision support tool provided by ICBF to support on-farm mating decisions. Genetic gain is based on the principle that the mean performance of the current generation should exceed that of previous generations. Sire advice aims to:

- Provide farmers with a bull selector tool to identify available sires that are consistent with their breeding goal.
- Identify the most complementary match between the chosen sires and females in the herd to maximise the chance of producing high genetic merit offspring but also a more consistent herd.
- Avoid excessive expected inbreeding in each advised mating.

Additional options available in sire advice include the potential to select cows for crossbreeding (by maximising the level of heterosis), mating to beef bulls (i.e. the lowest EBI cows in the herd), or for culling (i.e. the lowest cows ranked on the C.O.W. index). Since the launch of Sire Advice in 2018, >3,300 farmers have run the application for their farm.

Personalised breeding programs

Genetic evaluations are a method of estimating an animal's genetic potential. During this process, herd effects (i.e. environment and management) are simultaneously estimated, but until now, these effects have not been fully utilised. Herd effects, or what is termed *best linear unbiased estimates* (BLUEs), are analogous to milk or fertility proofs generated for bulls but instead are milk or fertility "proofs" generated for each herd. Recent research carried out in Teagasc Moorepark indicates that the response in cow performance to selection on EBI differs depending on the herd BLUE, a term often referred to as genotype-by-environment interactions (or GxE). For instance, increasing a herd's genetic merit for milk yield by 100 kg has a 20% greater impact on performance in high milk BLUE herds than in low milk BLUE herds. In contrast, the response to selection on genetic merit for fertility was almost five times greater in poor fertility BLUE herds than in the best fertility BLUE herds; poor fertility BLUE herds are underperforming relative to their genetic merit. Herd BLUE levels also impact the observed benefit from heterosis; herds with the poorest BLUEs realise, on average, the greatest benefit from crossbreeding, suggesting that crossbreeding helps mitigate poorer management. For example, the benefit of heterosis for calving interval in poor fertility BLUE herds was almost double the benefit in good fertility BLUE herds (Figure 1).

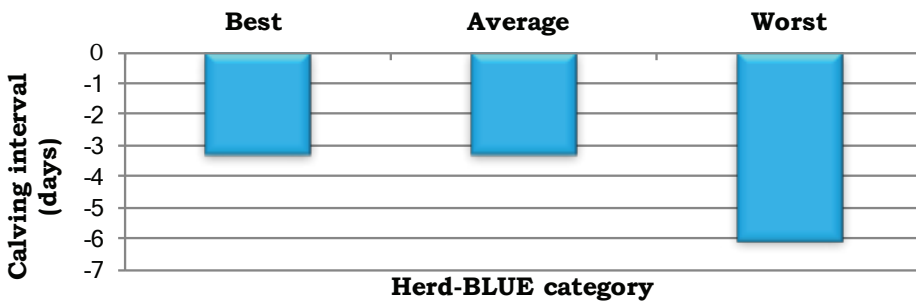


Figure 1. Holstein X Jersey heterosis effect on calving interval (days) in herds with the best, average and worst BLUEs for fertility

Conclusions

Decisions support tools have the potential to support more-informed management decisions on-farm. Utilising all sources of data, including information collected on-farm, increases the benefits of these tools.