Impact of breeding for dairy traits on beef production

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Summary

- Recent genetic trends indicate a decline in beef merit in the offspring of dairy cows.
- Inclusion of beef merit in the EBI is required to ensure sustainable and profitable beef markets for animals coming from the dairy herd.
- With careful selection of traits and appropriate breeding strategies, it is possible to optimise beef production while also optimising desirable dairy cow traits.

Introduction

Irish dairy herds have made considerable genetic progress for both milk production and fertility traits, as well as breeding cows with lower maintenance requirements. However, focusing on these traits can have unintended consequences, such as a decline in beef merit. Although beef production may not be a key component for many dairy herds, it is important to at least maintain beef merit in dairy cows, as their calves now account for a large component of the beef industry.

Trends in beef traits of progeny in dairy herds

Over the last 10 years, breeding values for carcass weight have reduced by 4.7 kg, while conformation (i.e. muscle development) has reduced by 0.2 units in offspring with a dairy dam and a dairy sire. Similarly, over the same period, there has been a decrease in breeding values for carcass weight and conformation in animals from dairy dams and beef sires, with a reduction of 1.4kg and 0.4 units, respectively (Figure 1).

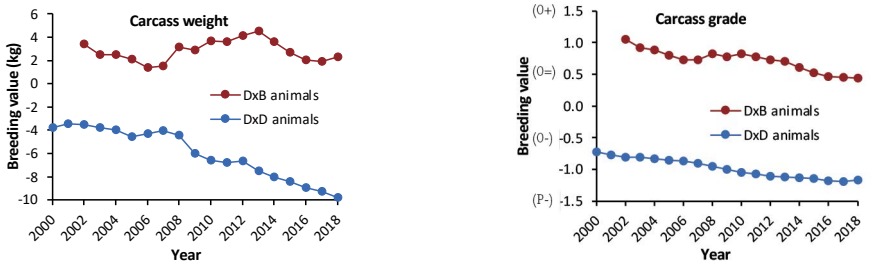

Figure 1. *Genetic trends in beef merit by year of birth for the offspring of a dairy dam and a dairy sire (blue line), as well as the offspring of a dairy dam and a beef sire (red line)*

Why is beef merit of dairy cows declining?

The aim of this study was to investigate the genetic relationships that milk production traits, fertility traits and cow maintenance traits (i.e. live weight) have with carcass traits. Genetic correlations were used to describe this relationship, which shows to what extent the two traits are influenced by the same genes. For instance, when the genetic correlation between two traits is high, as in the case of cow live weight and cull cow carcass weight (which has a genetic correlation of 0.81), it means that many of the same genes affect both traits. Correlation values range between -1 (negative relationship) and +1 (positive relationship); the larger the magnitude (i.e. the further from 0), the stronger the relationship between the two traits.

The increase in genetic merit for milk solid percentage traits is a potential reason for the decline in beef merit. Cows that are genetically good for milk solid percentages will on average have progeny genetically poorer for carcass traits, but the negative relationship is relatively weak (i.e. correlations ranging from -0.18 to -0.28). This weak relationship is good for animal breeders as selection for outliers is relatively easy in animals with good genetic merit for both carcass traits and milk solid production traits.

A more complex breeding relationship exists between cow maintenance and beef production. The dairy breeding goal is to breed smaller, lower maintenance cows as these animals are lower cost and require less expensive concentrate feed. There is a belief that it not possible to breed for a smaller cow and increase carcass weight of progeny. Recent research indicated a strong unfavourable relationship between the two traits (i.e. a genetic correlation of 0.71 between cow live weight and carcass weight of progeny). Therefore, selecting solely to improve cow maintenance (i.e. lighter cows) will negatively impact the carcass weight of progeny from dairy cows. Breeding for lower maintenance cows also has a strong unfavourable impact on age at slaughter. The strong genetic linkage makes it more difficult to find outliers. A similar unfavourable genetic link exists between milk production traits and fertility traits. Through the use of the EBI and a well-designed breeding program, outliers were identified that were good for both milk production traits and fertility traits. In Figure 2, sires highlighted in red have daughters with low maintenance (i.e. low live weight) but these daughters also produce progeny with good carcass weight. In terms of carcass conformation (i.e. muscling), there is a weak positive genetic correlation (0.25) with dairy cow live weight, meaning that low live weight cows have progeny with poorer carcass conformation. We can counteract this negative relationship by also breeding for conformation.

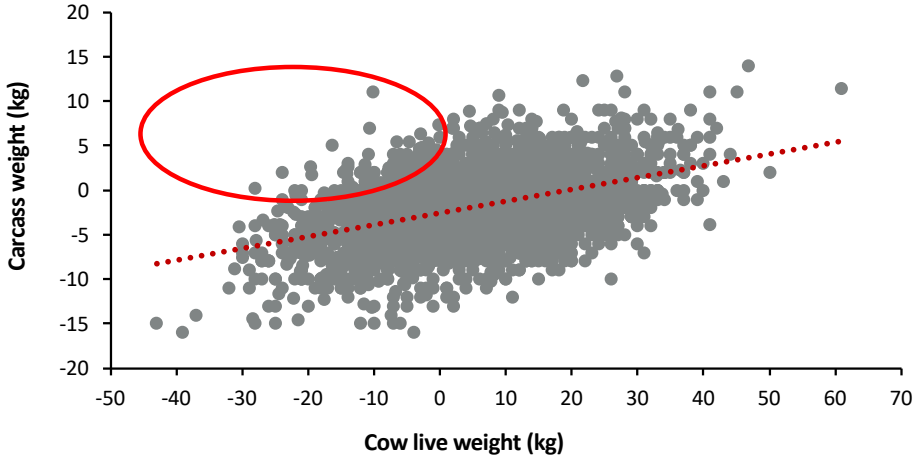

Figure 2. *Plot of breeding values for carcass weight and cow live weight for Holstein-Friesian sires. Sires highlighted in the area outlined in red are positive for carcass weight and have a low cow maintenance breeding value*

Conclusions

Recent genetic trends indicate a decline in carcass weight and conformation in the dairy herd due to high selection pressure for both milk production and fertility traits. However, with appropriate breeding strategies, it is possible to optimise beef production while still maintaining other desirable traits in dairy cows. Recent updates to the EBI have changed the beef sub-index, which now penalises animals that do not meet carcass specifications and animals which take longer to finish, this will help improve the genetic trends for beef traits. In addition, using the Dairy Beef Index to select beef sires to use on dairy cows will improve the resulting progeny beef merit.