Genomics Advances Breeds Confidence in Selection Direction

The introduction of SNP chips in 2008 made the genomic testing of Holsteins a reality and with the advent of the 1000 bull genome project in 2012, imputed data has made it economically viable to test females on farm. Nine years ago to receive a female proof that is 67% reliable would have taken until an animal had completed its third lactation, now you can have that level of reliability in a matter of weeks from when the animal is born.

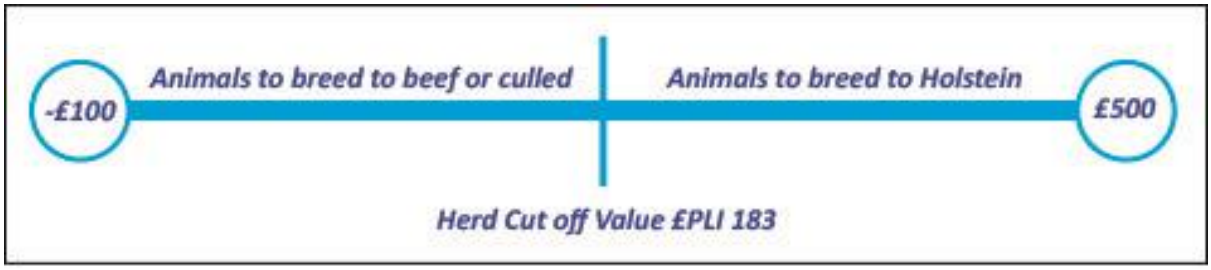
Year on year more farms, both pedigree breeders and commercial dairy producers, are genomically testing females, but how do you decide which animals and how many do you test?

Selection intensity will dictate how best to implement female testing on farm. Selection intensity in females is dictated by replacement rate, number of heifers available to breed and the use of conventional or sexed semen. If your selection intensity is high it may allow you to pre-screen which heifers to test using parental averages. If selection intensity is lower you may need to test more animals. Genomics gives you confidence in breeding the top animals to top bulls. By doing this it enables a higher proportion of the herd to be bred to beef. The revenue you gain from more beef calves is an important factor to consider when deciding if you should undertake genomic testing.

Let us not forget the cows. It is all very well to decide your highest genomically tested heifers will get bred to Holstein but what if a cow is of higher genetic value (£PLI/NM$) than some of the heifers? In some instances these lowest heifers can be bred to beef. Equally, on the flip side it is not wise to cull your bottom 20% of heifers as they have lowest £PLI in their heifer cohort. These heifers may still be genetically better than their older counterparts in the herd. Do not fall into these traps. Working out a £PLI cut off value (See fig 1.) for a herd is complex but it is essential to ensure that you maximise the use of genomics.

Will we see a plateau to genetic advancements in the Holstein population? This question is difficult to answer for two reasons. Firstly, selection responses usually end after 20-30 generations but in some cases significant responses have still been seen after 100 generations. Secondly, heritability of lactation milk yield is currently 35%, in 1950 it was 25%. Some of this gain may be due to management, but it does not look like genetic progress is currently slowing. I do not believe that we will see genetics slow as much as change. With processors and the public putting different constraints and expectations on producers we are more likely to see a shift in selection direction. An example of change in selection direction is fertility. Since the launch of the fertility index, Holstein fertility has dramatically improved back to levels seen in the late 1980's and still improving rapidly.

Figure 1. Cut off value



Inbreeding will always be present in a finite population. We cannot get around this fact. Has genomics been the saviour for inbreeding in Holsteins? Not yet. Since the advent of genomics a more diverse set of bulls have been sampled for genomic analysis. However, the number of bulls siring 50% of the young bulls entering AI remains the same. Genomics has allowed for more detailed

study of how inbreeding is taking place at a genetic level, previously relying on PAs has had limitations. Advanced breeding tools are being developed to analyse inbreeding at a genomic level and they will become commercially available in the future. In essence whilst not saving us from inbreeding genomics will allow us to accurately manage inbreeding whilst maintaining genetic progress.

Where is the future? AHDB must be commended for their ongoing work in producing new indexes, most notably TB advantage, but also for mastitis and they are working on a new lameness index. It's well known that different progeny groups have different methane emission levels and current research suggests this will be recognised by genomic testing. Emission data will complement feed efficiency, another index that is in the offing. Combining genomic selection with the rapid advancements in ovum pick up and in virto embryo production Holstein genetics will move at the fastest rate we have ever seen.

Developments in reproductive technologies are exciting and will continue to become more affordable. Gordie Jones' would say that "Genetics is never the bottleneck on a diary" and he is correct, we know that genetics will not mask a suboptimal environment or poor management. But, equally it costs the same to breed a good animal as a poor one and remember, genetic gain is cumulative.

At Westpoint we are working with our diary clients who are using genomic testing to ensure that they can realise the potential that it unlocks. For further information on genomics or any questions on this article email Matt on matt.gue@westpointfarmvets.co.uk. For further information on Westpoint Farm Vets please visit our website www.westpointfarmvets.co.uk.

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