



INBREEDING VS. GENETIC PROGRESS

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As the rate of inbreeding increases, there is increasing concern about future genetic diversity in the global dairy population. Although there is no denying that inbreeding is on the rise, genetic progress has also increased at unprecedented rates during the past decade. While genetic progress cannot be the only goal, focusing solely on lower inbreeding will not compensate for lower genetic values.

A careful balance between genetic progress and inbreeding must be achieved to optimize long term profitability and sustainability of dairy cattle.

What level of inbreeding is safe for my herd?

The "safe" level will vary by animal and by herd based on the amount of homozygosity (like genes) inherited from recent common ancestors and their detrimental impacts. **Recent inbreeding is of more concern.** The overall inbreeding coefficient does not effectively evaluate inbreeding risk. We need the analysis of the genome to tell us more about age of inbreeding.

Does this mean I can use bulls that are highly inbred in my herd without problems?

The relationship of the bull to the herd is more important than inbreeding of the bull. It is best to use sires with lower relationship when possible, but inbreeding control must always be balanced with genetic progress. Just because an individual bull is more inbred, does not mean that he will cause higher inbreeding within a particular herd if the herd has used unrelated bulls in the past. Inbreeding relative to the population does not necessarily mean inbred relative to the herd (or the individual animal).

Is inbreeding today less dangerous than it was 20 years ago?

Inbreeding is less risky than it used to be, as we can use genomic testing to identify detrimental genes like recessives and negative haplotypes. New deleterious mutations are also identified much faster, allowing us to eliminate the use of the animal for breeding purposes, or to make more educated breeding decisions to prevent mating of carrier animals.

What is the difference between GFI and EFI?

GFI is Genomic Future Inbreeding. EFI is Estimated Future Inbreeding calculated from pedigree. Both GFI and EFI are measures of proportion of genes in common between individuals due to common ancestors. **GFI tends to be higher and more accurate than EFI** in most cases. GFI looks at the genes while EFI looks at probability of gene inheritance through the pedigree.

Why does it seem like the highest-ranking bulls have higher inbreeding?

When we select intensively for specific traits generation after generation, we are selecting for the good genes that produce those traits, which results in more common genes. **Higher genomic inbreeding is partly a result of faster genetic progress,** as the highest-ranking animals tend to have similar genes for the trait under selection.

How is SSI/WWS going to maintain a level of diversity in the genetic program?

Supplying genetics to a global market requires diversity within our bull population, as different markets and management systems have different genetic needs. **The size of our bull population, sourced from large number of herds,** as well as the diverse needs of our customers, **helps us to maintain diversity in our genetic portfolio.**

What is being done to balance genetic progress with the detrimental impact of inbreeding?

For years, CDCB has adjusted PTA values based on the inbreeding regression factors. **For every percentage point change in inbreeding compared to the base population, a regression factor is applied to the animal's published PTA values.** As bulls age and have more sons and grandsons in the population, their relationship to the population increases.

SUMMARY

Tools like WMS and StrataGEN are essential in helping producers to maintain genetic diversity (control inbreeding) while maximizing genetic progress in their herds and should be utilized in every genetic strategy. Talk to your Genetic Advisor about creating a genetic strategy for your herd today.



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