Genotyping is the base of data driven dairy farming

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Abstract

With a rapidly growing world population, it is estimated that protein production will have to double by 2050 using half of the available resources. Hence, dairy farmers face an immense challenge. To stay sustainable means to farm at high efficiency. Increasing the efficiency of dairy farming becomes more feasible as the amount of information on herd and resources increases. The first steps towards data driven herd management are visible in the recently introduced agricultural innovations. Examples are the automated milking robot, fertility sensors and online management applications. So-called 'precision farming' or 'smart dairy farming' are new terms to the industries jargon that are now frequently mentioned.

Efficient management allows for high phenotypic performance. The dairy cattle AI industry has exploited recent genetic technology advances with the introduction of genomic selection. The same methodology is however also available for dairy farmers.
With the number of young females entering the USA national genomic evaluation every month growing exponentially, it is safe to say that precision breeding has made its appearance. The Netherlands counts 360 producers who have genotyped their entire herd and use this genomic information for herd management. Collected data of these farms has shown that approximately 10-13% of calves get assigned wrongly to either the bottom or top of the list when ranked on parent average (milk yield), compared to the same rank based on their genomic breeding value. Consequently, selecting the top 75% of animals as breeding animals based on genomic merit resulted in an average breeding value of +100kg milk as to a group selected on parent average (Eaglen et al., 2015). Hence, genomic testing provides an opportunity to increase the efficiency of breeding. Instead of having to wait until an animal has multiple lactations until information on genetic merit is somewhat reliable, a farmer is now presented with it shortly after an animal is born.

To support dairy farmers worldwide CRV launches a concept that links the genomic test to its mating program and structural genetic consultancy. CRV aims to provide the dairy farmer with control on a part of his herd management which has always been rather intangible. By bringing all genetic and phenotypic information on the herd together in a management application, CRV wants to support the dairy farmer exploit his precision breeding with full efficiency towards his tailored breeding goal.

CRV expects 50% of Dutch farmers to genotype every newborn animal by 2020. The role of genomics to grow within herd management, supported by findings from the many studies worldwide on the link between phenotype and genotype. Knowing the genomics of the cows will be as normal as knowing the composition of your silage, feed and milk. Hence, while the farmer strives for continuity by ever increasing his management efficiency, the use of genomic information in commercial herd management can be seen as the first step in the future of precision breeding.

References

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