

## Applications of haplotypes in dairy farm management

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Haplotypes from genomic tests are now available for almost 100,000 dairy cows and heifers in the U.S.. Genomic EBV values are accelerating the rate of genetic improvement in dairy cattle, but genomic information also is useful for making improved decisions on the farm. Mate selection strategies have usually been based on maximization of genetic progress subject to restrictions on inbreeding, and assuming the transmission of average rather than actual chromosomes, limiting selection gains. Genetic progress can be improved by simulating matings of all cows to a portfolio of potential mates and those which provide the desired outcomes selected. In the case of commercial cows, matings which minimize the variance of outcomes while conditioned on some average desired EBV should be selected. In the case of germplasm producers, the skewness parameter of distributions can be compared to identify matings with the greatest likelihood of producing offspring with superior EBV. This will increase the rate of genetic progress and reduce the number of animals culled for poor performance resulting from inferior genetics. Low-density SNP tests on dairy calves can be used to increase profitability by increasing the genetic value of the calves raised and used as replacements in the herd, increasing gains through the dams-of-cows pathway. Genotyping calves also can result in increased lifetime profitability. In a simulation study in which the top 90% of calves were retained based on parent average selected calves had EBV \$110 greater compared to all calves. When a low-density genomic test was used, \$14 per kept calf was gained, but the value of testing decreases as the proportion of calves kept increases. Haplotypes also have been used to identify novel recessives in the Brown Swiss, Holstein, and Jersey breeds, as well as to successfully fine-map the Weaver locus. Future uses of haplotypes include identification of animals resistant to common diseases and identifying those most likely to respond to nutritional and reproductive technologies.

Key words: haplotypes, mating strategies, recessives