

Wide-spread adoption of customized genotyping improves European cattle breeding

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With the Illumina Bovine 54k chip in 2008, genotyping of cattle populations saw widespread adoption in European cattle. In 2009 a number of cattle breeding companies and academic institutions formed the EuroGenomics (EG) collaboration, initially with members from six countries, Germany, France, The Netherlands, Denmark, Finland and Sweden later joined by Spain and Poland. Chip genotypes were exchanged, each contributing 4,000 proven bulls. In March 2010, the reference population was extended to 16,000 bulls, which further enhanced the accuracy of genomic breeding values.

The EG partners developed a customized LD chip array called EuroG10K. The array was based on the Illumina LD chip and optimized to include markers to aid imputation in additional breeds including smaller ones. The shared part of the chip includes polymorphisms known or suspected of causing various phenotypic effects including, recessive lethal alleles, milk protein variants, polymorphisms marking QTL for traits of interest and the ICAR parentage control set. The EuroG10K chip consists of a shared and a private part which can be used by partners, offering a high flexibility compared to other chips. In addition, the shared use results in better prices and a more affordable service to farmers. Till now more than 900,000 animals have been genotyped. Results on imputation efficiency for multiple breeds and the accuracies of indices for yield and fertility in Holstein will be presented.

We demonstrate the widespread adoption of this cheaper and customized chip including outside the Holstein breed, and not least in the broader cow population. This has led to improved imputation and accuracies of predicted breeding values, increased numbers of bull calves evaluated and enhanced management of recessive disease alleles. The chip allows farmers to use genotyping as a management tool. Use of marker information in farm-level management has as yet not fully exploited. A significant side effect is easy large scale evaluation of candidate polymorphisms.