Abstract by Jennie Pryce - Genomics – what does the future hold?

Genomics is a new, exciting technology that has rapidly been adopted by the dairy industry. Young bulls are now being offered with their proofs calculated using information from DNA markers. As the reliabilities of bull proofs increases, we will see a shift from traditional progeny-testing schemes, to hybrid schemes where smaller teams are selected on the basis of their genomic breeding values, to schemes were young sires are marketed on their genomic breeding values and are replaced after only a few years by the next, genetically superior crop of bulls. These bulls will probably still get conventional breeding values, although perhaps only for those traits that data is required for other purposes. For example, yield, health and fertility data will still be needed for management reasons and will continue to be recorded. However, for other traits such as conformation (type) traits, that breeding companies have traditionally made an effort to record on young progeny tested bulls, it is not clear how the mature genomic-evaluation model will look. One option is that breeding companies or farmer co-operatives will work intensively with a representative sample of herds, on which they will record a raft of traits of importance. Increasing the reliability of genomic proofs is one of the key challenges right now. Ways in which this can be achieved are: 1) increasing the size of the reference population, which is likely to be more cow-focused in the future as the length of time which individual bulls are used for decreases 2) increasing the density of genetic markers or using the entire genome sequence 3) using better statistical methods. As progeny-testing reduces, the number of young bulls used a year is also expected to reduce, which will present challenges for maintaining the reference population – for which genotyping herd recorded cows is an obvious solution. Additionally, it is likely that young sires will be turned over more rapidly, so bulls that are "breed icons" may become a thing of the past and replaced with team-products. This could mean that breeding decisions evolve into exclusively computer-based decisions as remembering extensive cow and bull pedigrees so that inbreeding is avoided becomes more difficult – even for the fanatic. Finally, as genotyping becomes cheaper, we might see genotyping of even commercial cows become normal practice. This information can be used to 1) identify parentage with certainty; 2) generate sophisticated mating plans that help to optimise genetic gain and avoid inbreeding (at the genomic rather than pedigree level); 3) select replacements or candidates to sell; 4) avoid genetic defects and 5) select for difficult to measure traits such as feed conversion efficiency or methane emissions.