Abstract by Alison Van Eenennaam - How might DNA-based information generate value in the beef cattle sector?

Using DNA information for parentage determination and recessive carrier status is an often undervalued benefit of genomics research. These "simple" applications enable the management of recessive conditions and the correction of pedigree errors which result in an improved rate of genetic gain. The promise of using DNA information to directly make better selection decisions is a tantalizing prospect. Value has been clearly demonstrated in the dairy industry and adoption had been rapid. However the beef industry presents a number of challenges when it comes to using DNA-based information to improve the accuracy of selection. The beef stud sector tends to include a small number of disperse nucleus breeders operating in the absence of records for many economically important traits (fertility, disease resistance, feed efficiency). The industry makes extensive use of natural service bulls and there is significant value associated with the hybrid vigor derived from cross breeding. Additionally, the industry is segmented (breeder, producer, processor) and there is often little transfer of information and/or profit between sectors. This limits the availability of phenotypic records for many economically important traits and the value proposition associated with DNA testing. Ultimately the size of the genotyped, phenotyped training dataset bounds the accuracy that can be achieved with DNA-testing. Cumulatively, these factors are likely to frustrate the rapid implementation of genomically-enhanced PTAs for beef. There is limited value associated with the improved genetic gain resulting from increasing the accuracy of PTAs for yearling natural service bulls destined to sire less than one hundred progeny over their lifetime. However, from the viewpoint of an individual bull buyer, improving the accuracy of a trait like calving ease by investing in a genomically-enhanced PTA for a young bull to breed heifers may be money well spent in terms of risk avoidance. Commercial farmers could also use DNA tests to improve the accuracy of replacement female selection. This assumes the development of low-cost DNA tests that perform well for the low heritability traits that directly affect maternal performance (e.g. heifer pregnancy) in commercial cattle populations. Genomics would most benefit the beef industry if it results in selection approaches for hard-to-measure, economically relevant traits that are currently omitted from breeding objectives due to the absence of selection criteria upon which to base breeding decisions.