During the 100-yr history of the American Society of Animal Science, there have been many tools that have been offered to the beef producers of the world. Advancements in reproductive and nutritional technologies have had major impacts on how cattle are managed. However, the advent of beef performance recording and the subsequent advancements in methodology for genetic evaluations and applications of that methodology to utilizing those data have dramatically changed the beef population. The purpose of genetic evaluation is to harness the power of selection into a tool that can be used by producers to improve their stock. The evolution of genetic evaluations has taken us from making selection decisions based on phenotypic observations on individuals to making genetic predictions of those individuals resulting from the analysis of millions of records from both national and international sources across multiple breeds. However, animal agriculture is currently in a period of transition prompted by the advent of molecular biology. From the late 1980s until the present, great advancements have been made in molecular technologies, and it was initially thought that predictions of genetic merit from molecular assessment would replace genetic evaluations as the primary tool for making selection decisions. It is now recognized that there is a need to integrate the 2 technologies into a more reliable selection tool for producers. This challenge was the focus of the Beef Symposium held on July 8, 2008, at the joint annual meeting of the American Society of Animal Science and the American Dairy Science Association in Indianapolis, IN. The purpose of this symposium was to review the advancements that have been made in genetic evaluations and to take an in-depth look at fully exploiting its future potential as a conduit for delivering molecular information integrated with the traditional phenotypic and pedigree information.

B. D. Golden (Benyshek, 2008; Golden et al., 2009) documented the successes and limitations of beef cattle genetic evaluations over the past 35 yr. Driven by the breed associations, who recognized an advantage in improved selection tools, genetic evaluations and the computation of EPD have made great strides. Advancements in computing technology and statistical methodologies have enabled the beef industry to prosper through improved selection accuracy. However, the authors were critical of the pace of the industry in implementing decision support tools and encouraged further advancements in this area.

D. J. Garrick (Garrick and Golden, 2009) then described where we currently stand in beef cattle genetic evaluations. It was pointed out that the computation of EPD is still controlled by breed associations and the process is data-driven rather than goal-driven. This approach is not as conducive to developing selection schemes based on economic merit. The authors also criticized the reluctance of breed associations to advance across-breed genetic evaluations.

R. L. Fernando (Fernando and Stricker, 2008) proposed that with phenotypic and marker information on enough animals, marker effects can be estimated accurately and used for genetic evaluations of future offspring using marker information alone. Using simulated data, Fernando and Stricker (2008) showed the effect on the accuracy of predicting breeding values on the next generation when including differing amounts of marker information, along with phenotypic information. Fernando and Stricker (2008) concluded that reasonable accuracies for genetic merit could be reached using information from large DNA marker panels.

An integrated approach to utilizing high-density SNP panels with current phenotypic and pedigree information was presented by R. J. Tempelman (Tempelman and Kachman, 2008). Molecular breeding values, computed by various DNA companies, were included in the models used in National Cattle Evaluation as correlated traits. It was shown that this methodology can increase the accuracy of predicting genetic merit and produces
an EPD that would be used in an identical way to the current use, by producers, of EPD.

Through the efforts of the National Beef Cattle Evaluation Consortium and partner institutions, organizations, and industries, beef cattle genetic evaluations continue to improve the ability of beef producers to make sound selection decisions.

LITERATURE CITED


