



ADVANCING SUSTAINABLE LIVESTOCK PRODUCTION

The ARS food animal production research program improves food animal production efficiency, sustainability, animal welfare, and product quality while safeguarding animal genetic resources. Animal production is a critical component of the U.S. economy, yielding \$440.7 billion in economic output, with \$76.7 billion in earnings, \$19.6 billion in income taxes, and \$7.4 billion in property taxes in 2014. The following accomplishments highlight ARS advances in animal production research in FY 2020.

A high-quality cattle gene atlas. ARS scientists in Beltsville, Maryland, developed a high-quality resource for discovering the tissues, genes, and genome structure that control traits in cattle. This comprehensive “gene atlas” helps identify the genes and the specific changes within genes responsible for differences in traits between animals. It also identifies the tissues throughout the body responsible for expression of these traits. This gene atlas will be a critically important resource for improving important livestock traits.

New, affordable method for conducting genomic analyses of crossbred cattle. ARS researchers in Clay Center, Nebraska, developed a new method for studying trait-genome associations in crossbred cattle that is more effective and costs less than currently available technologies. This new approach will enable producers to study more cattle and conduct finer-scale genomic analyses of these cattle. Ultimately, this new method will improve selection accuracy and increase genetic gain, leading to a faster rate of improvement in valuable beef traits for the industry.



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New method to improve the identification of genetic markers for feed efficient pigs. Genetic markers enable breeders to efficiently and affordably screen thousands of individuals and select the subset of individuals with the desired traits. ARS scientists in Clay Center, Nebraska, developed a methodology using gene expression data to develop genetic markers for feed efficiency in pigs and found 36 markers associated with feed efficiency. The markers identified in this study are available to commercial genotyping companies working with producers to improve pig feed efficiency.

Weaning-associated fungus *Kazachstania slooffiae* likely has positive role in piglet growth and health. Dramatic changes in fungal microorganisms after piglet weaning may contribute to the growth and health of weaned piglets. ARS scientists in Beltsville, Maryland, conducted genomic analyses of *Kazachstania slooffiae*, the most dominant post-weaning fungus in healthy piglets, and found that it has positive interactions with beneficial bacteria in the piglet gut. These results support the concept that *Kazachstania slooffiae* can be used as a naturally derived probiotic to enhance piglet growth.