ADVANCING SUSTAINABLE LIVESTOCK AND POULTRY 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 2019.

Increases in pork carcass weight will improve tenderness of pork loin chops. Historical trends indicate the size of U.S. hogs will likely continue to increase. ARS scientists in Clay Center, Nebraska, and University of Illinois and Kansas State University collaborators found that the heaviest group of carcasses weighed 36 percent more than the industry average. This group represents the expected average carcass weight by 2050. The increased carcass weight resulted in loin chops that were juicier and tenderer and had minimal effect on other pork quality traits, improving overall eating quality.

Characterization of the porcine mycobiome (fungal microbiome). ARS scientists in Beltsville, Maryland, performed the first in-depth analysis of the gastrointestinal tract mycobiome of piglets between birth and postweaning transition. These scientists reported a dynamic shift in the fungal mycobiome at the time of weaning, suggesting that milk may suppress gut fungi and may be important for preweaned piglet health. Likewise, if the same factors are present in cow's milk and are not damaged by pasteurization, they could provide health benefits to humans. In addition, postweaning diarrhea in piglets is a common production problem, which may be influenced by this shift in the mycobiome.

New method improves genome assembly. ARS researchers in Clay Center, Nebraska, and Beltsville, Maryland, and collaborators at the National Institutes of Health, University of Nebraska, and University of Kentucky pioneered a method for improving the assembly of genetic sequence data and developed the most complete and correctly ordered genome sequence to date for Yak and Scottish Highland cattle. The assembly is of equal or better quality than any existing mammalian genome assembly, including human. This strategy would rapidly improve the quality of other livestock and plant genome assemblies.

National genomic evaluations for crossbred dairy cattle. ARS researchers in Beltsville, Maryland, collaborated with the Council on Dairy Cattle Breeding (CDCB) and São Paulo State University in Brazil to develop the first genomic evaluations for crossbred dairy cattle. CDCB adopted the new evaluation methodology, and genomic evaluations for crossbreds were released to the dairy industry for the first time in April 2019. This new evaluation methodology will help dairy producers who have turned to crossbreeding to counter decreases in fertility associated with purebred dairy cows.

New model to predict illness using swine feeding behavior. ARS scientists in Clay Center, Nebraska, with South Dakota State University collaborators developed a model to predict swine feeding behavior based on temperature and time of day and observed large deviations between predicted and observed behaviors before and after a pneumonia outbreak. This provides the groundwork for developing software using real-time feeding behavior as an early predictor of illness and stress in individual animals.