



## How ARS Does It: Prioritizing Animal, Human, Plant, and Environmental Health

The ARS Animal Health research program protects and ensures the safety of the nation's agriculture and food supply through improved disease detection, prevention, and control. Solutions to mitigate virus exposure are necessary to improve animal health and prevent the spread of diseases.



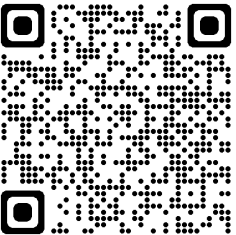
ARS researchers are developing diagnostics and mitigation strategies to detect, control, and eradicate animal diseases and health issues, such as by studying genetic variants to prevent congestive heart failure in bovines. The following accomplishments highlight some of the ARS advances in animal health research in 2022.

**Genetic resilience to ovine progressive pneumonia.** Ovine progressive pneumonia (OPP) is a progressive, incurable viral disease of sheep that can increase susceptibility to secondary diseases, ultimately resulting in millions of dollars of annual economic losses to the sheep industry from death and productivity losses. ARS researchers in Clay Center, Nebraska, used data from three long-term, multi-generational studies to evaluate how genotype combinations of the TMEM154 gene affect OPP infection status and ewe lifetime productivity. In a common environment, and with similar levels of natural virus exposure, fewer than 10 percent of ewes with the favorable genotype became infected with OPP through 5.5 years of age, but more than 80 percent of ewes with the unfavorable genotype were infected by 3.3 years of age. Ewes with the favorable genotype produced 2.1 more lambs and 40 kg greater total weight of weaned lambs over a 5-year period. Identifying the favorable TMEM154 allele combination and subsequent genetic selection will improve flock health and lifetime productivity, with an estimated economic impact of \$171 per ewe in additional lifetime revenue. Producers are now able to capture this impact through testing and selection. [\(NP 101\)](#)

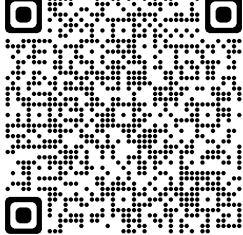
**The placenta of sheep with atypical scrapie is not infectious.** Scrapie is a disease of sheep caused by the accumulation of abnormal proteins, called prions, in the central nervous system. This disease has been almost completely eradicated in the United States because of concerted efforts to breed sheep with genetic markers associated with high resistance to the classical forms of naturally transmissible scrapie prions. Nor98-like scrapie is a sporadic, atypical form of scrapie thought to spontaneously arise in the central nervous system of aging sheep. ARS researchers in Pullman, Washington, confirmed that these atypical prion-like proteins accumulate in the placenta of scrapie-resistant sheep, but that the placental proteins are not infectious. This knowledge supports field evidence that Nor98-like scrapie is a spontaneous disease of sheep with low to no risk of natural transmission. Furthermore, this knowledge supports the continued use of selective breeding of scrapie resistant sheep to mitigate the occurrence of classical forms of scrapie in sheep. [\(NP 103\)](#)

**Genetic variants associated with bovine congestive heart failure.** Bovine congestive heart failure (BCHF) in feedlot cattle is increasingly common in North America's western Great Plains; reported losses in individual feedlot operations exceed \$250,000 annually, which could represent 10-20 percent of a feedlot's income. While BCHF is an untreatable, complex, and fatal condition, cattle affected with BCHF are typically bred and managed to achieve high-quality carcasses, so reducing BCHF's impact is a priority for the beef industry. ARS researchers in Clay Center, Nebraska, evaluated animals with end-stage heart failure from 30 different ranch sources, together with their healthy pen mates. The researchers discovered DNA markers in two major genes that are likely to play a role in BCHF development. Feedlot animals that had these markers were 28-fold more likely to develop heart failure than those without the markers. These markers will serve as the basis for a genetic test that can identify feedlot animals at the highest risk for BCHF in North America's western Great Plains. In herds suffering from BCHF, identifying high and low risk cattle will enable producers to make informed decisions for selective breeding and animal health management to reduce the impact of this disease. [\(NP 103\)](#)

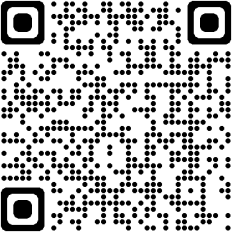
**Tick identification using spectroscopic analysis of host feces.** Ticks are blood-feeding parasites that vector pathogens of medical and veterinary importance and cause billions of dollars in economic losses globally each year. New methods for early detection of ticks, particularly exotic or invasive species, are needed; for instance, the timely detection of tick species on cattle hosts can mitigate the spread of devastating diseases like babesiosis and anaplasmosis. ARS researchers in Edinburg, Texas, and Texas A&M University collaborators found that Raman spectroscopy of infected host feces can be used as a non-invasive, non-destructive method to identify ticks. Further development of this surveillance method could lead to faster detection of exotic or invasive tick species or significantly reduce the time and cost of inspecting livestock as part of a tick management or eradication program. [\(NP 104\)](#)



Learn more about National Program 101



Learn more about National Program 104



Learn more about National Program 103

Stay up to date with ARS! Learn how we're solving major agricultural problems.



Agricultural Research Service  
U.S. DEPARTMENT OF AGRICULTURE

USDA is an equal opportunity provider, employer, and lender.

[www.ars.usda.gov](http://www.ars.usda.gov)

