Sensitivity of surveillance programs in vaccinated poultry populations

When considering an appropriate surveillance plan for vaccinated poultry populations, additional targeting and modification from baseline surveillance activities are needed. Both passive and active surveillance can be used in in vaccinated and unvaccinated populations, though passive reporting may be more difficult in vaccinated flocks when the vaccine is a good match to the circulating virus. Because of this decrease in sensitivity of passive surveillance, active surveillance should be increased in the vaccinated population to detect disease circulating at a lower prevalence. This active surveillance would allow monitoring for infection, detection of emergent new field strain viruses, verifying appropriate vaccination and supporting flock level freedom from disease. Both passive and active surveillance would remain important in unvaccinated populations as they were before vaccination.

The type of vaccine used will inform the test methodology that is most appropriate for the vaccine type – serologic versus molecular (polymerase chain reaction [PCR]) methods. Killed vaccines are limited to molecular testing until a recognized system to differentiate infected from vaccinated animals (DIVA) is readily available. This outlines the importance of utilizing vaccines that are DIVA compatible or vaccines compatible with serologic monitoring to leverage existing surveillance programs. Production purpose of the birds and their type (gallinaceous vs. non-gallinaceous) may also impact vaccine type and therefore surveillance approach. Biosecurity principles should be regularly enforced to prevent disease introduction, decrease lateral spread, and reduce the potential for spillover between populations.

The United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, Center for Epidemiology and Animal Health developed a within-flock transmission model to predict potential HPAI spread in vaccinated flocks with partial immunity, in collaboration with University of Minnesota. The model includes 3 immunity classes spanning minimal immunity to full immunity against systemic shedding. The model simulates chickens vaccinated with rHVT H5 vaccine and focused on non-ideal vaccination condition scenarios. Preliminary results indicate slow spread and longer time to detect HPAI in vaccinated flocks. Additional transmission studies will be important to inform parameters and scenarios to explore and inform surveillance options based on the outputs.