2025 Excellence in Multistate Research Award

NE2334: Genetic Bases for Resistance and Immunity to Avian Diseases

NE2334 project members at a recent annual meeting. Photo courtesy of Dr. Ali Nazmi, The Ohio State University

Since 1968, a team of researchers has worked to understand the genetics of immunity and resistance to avian diseases that cause serious losses each year and can pose health risks for other animals, including humans. Over the course of its remarkable 57-year legacy, this project has made significant advances that support a sustainable poultry industry in which poultry are healthy, producers are confident, competitive, and profitable, and consumers have a reliable supply of safe, high-quality poultry products. Advances in disease resistance and immunity are especially critical when use of conventional antibiotics is prohibited or ineffective.

Led by researchers at land-grant universities across the U.S. and supported by collaborators from the poultry industry, government agencies, and other institutions worldwide, this project has been able to continually adapt to emerging avian disease threats, integrate cutting-edge technologies, and respond to stakeholder needs. Long-term coordination has driven innovation and impact. Multiple institutions have worked together to develop and maintain poultry breeding lines with defined genetic characteristics. Over the years, these stocks have enabled multiple discoveries. For example, project members discovered, developed, and patented the principal component of the Marek's disease vaccines now used by virtually all poultry companies globally. Insights on poultry immune response to *Salmonella* and *Campylobacter*—common causes of human foodborne illness—could significantly reduce contamination and enhance food safety. Studies on resistance to heat stress will help breed poultry that are better adapted for challenging environmental conditions. Researchers have also identified feed amendments that could augment poultry immune responses.

Project members regularly share their findings with producers, breeders, vaccine developers, veterinarians, and other stakeholders. In addition to book chapters, technical reports, and outreach materials, researchers have published 1,125 articles in high-impact journals. Twenty-five percent of those articles are co-authored by project members from multiple institutions, demonstrating the project's longstanding commitment to collaboration.

The economic impacts of this project are substantial. Poultry companies worldwide have integrated project findings and tools into their breeding programs and flock management protocols. With total U.S. poultry production value reaching $151.6 billion in 2022, even a conservative estimate of 1% improvement attributed to this project represents $1.5 billion in added value. The global influence of this research is likely even more extensive.

Project Funding & Participation

This project, NE2334: Avian Disease Resistance and Immunity (2023-2028), is supported in part by USDA NIFA through Hatch Multistate Research Fund allocations to participating State Agricultural Experiment Stations at land-grant universities and other partners. **Current participants include:** University of Arkansas, Auburn University, University of California, Davis, University of Delaware, University of Georgia, University of Illinois, Iowa State University, University of Maryland, North Carolina State University, The Ohio State University, West Virginia University, Western University, and the USDA-ARS, Athens. **Current collaborators include:** USDA-ARS, College Station, Cotter Laboratory, and Hy-Line International. **Current international collaborators include:** University of Prince Edward Island, Ontario Veterinary College, International Livestock Research Institute, Roslin Institute, and University of Edinburgh. Prior collaborators include Agriculture Canada, McGill University, University of Aarhus, University of Ghana, Wageningen University, and Sokoine University of Agriculture. Previous and future iterations of this project may include other participants and partners. Project members have successfully secured substantial funding from a diverse range of additional sources to support and expand their research. **Learn more:** https://nimss.org/projects/19036.