

SUSTAINING MEMBER

UNIVERSITY OF NEBRASKA-LINCOLN

Ciobanu's research advances swine genetics, revolutionizing the industry

University of Nebraska-Lincoln molecular geneticist Daniel Ciobanu is a world-renowned molecular geneticist whose research and inventions have significantly impacted the field of animal genetics, with a particular focus on swine.

His work to identify genetic variants that affect traits like viral disease susceptibility, sow fertility and meat quality has led to three U.S. patents and two international patents. These have generated products used by farmers in Nebraska and beyond. Technologies stemming from Ciobanu's work are used routinely by swine genetics companies in the United States, which produce more than 100 million pigs annually and many more internationally.

"Dr. Ciobanu is truly innovative thinker whose work has led to greater understanding of how changes in DNA can affect attributes including nutritional efficiency, reproduction and resilience in livestock," said Derek McLean, dean and director of the university's Agricultural Research Division.

"His work has far-reaching implications for Nebraska and the entire animal protein industry."

Ciobanu, professor of animal science, was among the 162 innovators named NAI fellows in 2023.

"My research accomplishments represent a collaborative effort with contributions from many colleagues across multiple disciplines," Ciobanu said. "I am honored to be inducted as a fellow of the academy, and it is very special to me to be nominated by my colleagues and mentors who helped shape my career."

Since joining Nebraska in 2009, Ciobanu has mainly focused on identifying the genetic underpinnings of viral disease susceptibility in swine. His goal is to provide molecular solutions to farmers to increase the genetic fitness of their populations and reduce the economic impact of infectious diseases.

Ciobanu's most significant contribution relates to porcine circovirus 2, or PCV2, which costs U.S. swine producers more than \$250 million annually – most of which goes to vaccinations. Ciobanu led the largest genomic study to date related to the disease, an eight-year endeavor that integrated data from more than 1,000 pigs infected with PCV2, extensive genotyping and sequencing, and multiple cell lines developed in the laboratory for validation – the most expansive data set ever generated for this virus. His team ultimately identified the gene associated with pigs' susceptibility to the disease, paving the way for a patent and development of genetic tests that can predict PCV2 susceptibility.

These tests and many others were incorporated by Ciobanu's group in the SowPro90 DNA genotyping array, a collaborative effort between UNL, the U.S. Meat Animal Research Center and Affymetrix to support genomics research and development of commercial applications for swine genetic improvement. Technologies like these help producers improve the genetic resilience and health of their animals and reduce costs.

“This was one of my dreams, to discover the causal genetic source that could explain differences in viral disease susceptibility observed by farmers in the field,” Ciobanu said. “The 2018 paper where we reported the discovery of a novel gene associated with PCV2 susceptibility will be remembered for some time.”

His team is currently building on that discovery, investigating how that gene may impact susceptibility to other viruses in swine and other species.

Ciobanu has also advanced understanding of the genetic diversity of atypical porcine pestivirus, which causes congenital tremor in piglets, a condition that leads to nursing difficulties and poor survival. Ciobanu’s team designed, tested and recently reported an improved diagnostic test that identifies any strain of this highly diverse virus.

Prior to joining Nebraska, Ciobanu worked at Sygen International, where he investigated genes associated with traits important in swine and shrimp production, the latter of which was an emerging field at the time. His work related to shrimp contributed to the development of the first genotyping array, which is sold to shrimp breeding companies and researchers.

Before Sygen, Ciobanu conducted research at Iowa State University to pinpoint genes associated with improved pork quality. This work led to two patents for DNA markers related to glycogen metabolism and tenderness, as well as significant royalty-producing commercialization for ISU.

At the time Ciobanu was named an NAI Fellow, he had published 42 peer-reviewed journal articles, three book chapters, and 49 abstracts and peer-reviewed proceedings. He’s received several awards, including the Distinguished Service Award from the National Swine Improvement Federation and the Gamma Sigma Delta Excellence in Research Award from UNL. But his real passion is the day-to-day work of passing the spirit of invention to tomorrow’s researchers.

“I love to expose students to research, witnessing their excitement for science and discovery, and passing the knowledge to the next generation,” Ciobanu said. “That’s my No. 1. There is nothing more important than that.”

The University of Nebraska-Lincoln is among 13 founding institutions of the National Academy of Inventors. Ciobanu is the 12th Husker researcher to be named an NAI fellow.