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One Health in Action: Reducing Feral Swine Damage and Disease

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The One Health Newsletter is a collaborative effort by a diverse group of scientists and health professionals committed to promoting One Health.

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This quarterly newsletter is dedicated to enhancing the integration of animal, human, and environmental health for the benefit of all by demonstrating One Health in practice.

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One Health in Action: Reducing Feral Swine Damage and Disease

Sarah Bevins, PhD and Alan Franklin, PhD

One Health is a philosophical approach to human, livestock, and wildlife disease that encompasses multiple disciplines, including the medical, veterinary and ecological sciences. As One Health becomes more widely embraced, examples of its practice can be found in government-sponsored programs. Recently, the U.S. Department of Agriculture announced a new Feral Swine Management Program that will be administered and implemented by the Animal Plant Health Inspection Service (APHIS) and will embody the tenets of One Health.

As an invasive species, feral swine (*Sus scrofa*) are a classic example of a species that can profoundly influence ecological communities and ecosystems. They alter environments through a suite of well-known traits: rooting behaviors that alter soil properties and disturb plant communities; a generalist diet that can encompass seeds, crops, and animals; a rapid reproduction rate that can result in explosive population growth; and an adaptable biology that allows them to thrive in a range of habitats and climates. Along with these more familiar traits of an aggressive invasive species, feral swine can also reservoir and transmit a host of pathogens, and because of this, pathogen monitoring and research will be an integral part of the Feral Swine Management Program. Feral swine have expanded their range from 17 to 39 states in the U.S. in the last 30 years, and a One Health approach is needed to manage the agricultural and human health implications of a rapidly expanding invasive species.

The primary problems associated with pathogens transmitted by feral swine are twofold. First, many of the pathogens are zoonotic and therefore represent a human health risk. People have been infected with multiple strains of *Brucella*, Hepatitis E, *Trichinella spiralis*, and leptospirosis from feral swine. In addition, swine are a mixing vessel for influenza viruses that allow different strains to recombine. Many of these recombinant strains have resulted in human pandemics. This threat is heightened because feral swine have unfettered contact with wild water birds which are the natural reservoirs for influenza viruses. Viral transmission among feral swine and water birds presents a potential for increased emergence of novel strains of influenza that could affect both agricultural and human health. Second, because feral swine and domestic swine are the same species, pathogens in feral swine pose a risk to the domestic swine industry. Swine brucellosis and pseudorabies are examples of pathogens that have essentially been eradicated in the U.S. domestic swine industry, but both still currently circulate in feral swine populations throughout the U.S. Pseudorabies can also be transmitted to other domestic animal and wildlife species, where it can cause substantial morbidity and mortality.

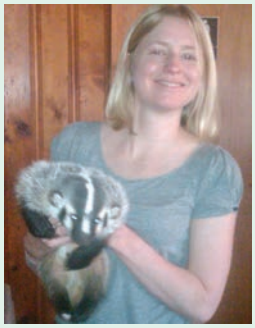
Another threat posed by feral swine is the introduction and spread of foreign animal diseases (FADs) in the U.S. These pathogens are not currently found in this country, but if pathogens which are infectious to swine are accidentally or intentionally introduced, feral swine could act as an unmonitored reservoir and create an enormous risk of exposure and infection to commercial herds. Classical swine fever is an example of an FAD that, if introduced to the U.S. domestic swine industry, could cause severe economic losses because of trade restrictions and loss of stock.

Feral swine settling in with a herd of cattle in Missouri.
Photo Credit: USDA: APHIS: Wildlife Services

The APHIS Feral Swine Damage Management Program will be the first nationally-led effort to reduce the expansion of this invasive species and to limit damage and pathogen transmission associated with feral swine. This program will focus on removing feral swine from multiple regions, including areas where there are isolated pockets of feral swine that can be eliminated, areas along the margins of feral swine distribution to stem population expansion, and areas with long-standing feral swine populations that could benefit from limiting population growth.

The eradication effort by USDA APHIS will establish procedures for disease monitoring. This effort will include developing new vaccination methods and conducting research and economic analyses to improve control practices, in addition to physically removing feral swine from the U.S. Multiple branches of USDA APHIS will be involved in this effort, including Wildlife Services, Veterinary Services, and International Services. Wildlife Services, with expertise in wildlife management and ecology, will provide the actual operative eradication programs and will also conduct research and pathogen monitoring through the National Wildlife Research Center (NWRC). Wildlife biologists, ecologists, geneticists, veterinarians, microbiologists, quantitative modelers, and economists will collaborate to efficiently meet the goals of the eradication effort. Veterinary Services will spearhead the diagnostic efforts for pathogens of concern, especially those of paramount concern for agricultural health. Samples from feral swine will be screened for five primary pathogens that threaten human and domestic animal health, including porcine reproductive and respiratory syndrome (PRRS), *Brucella* spp., pseudorabies, influenza A viruses, and classical swine fever. In addition to the five pathogens that will be monitored by the Feral Swine Management Program, data will continue to be collected on other pathogens as well, including leptospirosis, *Trichinella spiralis*, and *Toxoplasma gondii*. These samples will build upon an existing feral swine pathogen dataset that has been compiled by the NWRC National Wildlife Disease Program over the last seven years.

Disease issues associated with feral swine, because of their connection to zoonotic and domestic animal infections, require a One Health approach. This national effort proposes to eliminate feral swine from two states every 3-5 years and will attempt to stabilize feral swine damage across the U.S. within 10 years. Achieving this lofty goal will require a multi-disciplinary effort that includes expertise from the separate disciplines that define One Health.



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