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Development of Reproductive Control Methods for Overabundant Birds and Mammals

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National Wildlife Research Center Scientists Study Wildlife Contraception

Wildlife Services' (WS) National Wildlife Research Center (NWRC) is the only Federal research facility devoted exclusively to resolving conflicts between people and wildlife through the development of effective, selective, and acceptable methods, tools, and techniques.

Research on the reproductive management of various avian and mammalian species that cause damage or threaten public health and safety is a high priority for WS. The severity of human-wildlife conflicts often is directly related to wildlife population density: many problems are exacerbated as wildlife populations become larger. In many urban and suburban settings, for example, overabundant deer create safety hazards for motorists, consume ornamental shrubs, harbor and transmit diseases and parasites (e.g., Lyme-disease-bearing ticks), and degrade habitat quality in public parks and

other locations. Rodents also carry a variety of diseases (e.g., plague, hantavirus), and they damage rangelands and crops, causing the loss of millions of dollars in agricultural production. More than four million feral hogs now occur in at least 28 states, where they cause serious ecological damage as well as serving as a reservoir for pseudorabies and brucellosis. Overabundant feral horses in several western states continue to create ecological and political problems. Tens of millions of feral cats and dogs in the United States harass and kill wildlife and livestock, and create public health nuisances through their bites, waste, and transmission of diseases and parasites. In addition, when populations of native predators such as coyotes are locally overabundant, they are sometimes responsible for severe losses by livestock producers.

The goal of NWRC's wildlife contraceptive research is to develop and field test economical and effective agents to suppress reproductive fertility in local populations of selected species that are causing conflicts. Wildlife contraceptives can be used as an additional tool for the integrated management of local, overabundant wildlife species.

Applying Science and Expertise to Wildlife Challenges

Wildlife Contraception—NWRC researchers have successfully tested a single-injection, GnRH (gonadotropin-releasing hormone), immunocontraceptive vaccine (called GonaCon™) on free-ranging California ground squirrels, captive Norway



rats, feral cats and dogs, domestic and feral swine, wildhorses, elk, and white-tailed deer. Temporary infertility was achieved in all species tested. Ongoing field studies in Maryland and New Jersey are evaluating the safety and efficacy of this vaccine, as required by the U.S. Environmental Protection Agency.

Development of the single-injection form of the GonaCon™ vaccine was made possible by the creation at NWRC of a new adjuvant called AdjuVac™. An adjuvant is an immunological agent that is added to a vaccine to improve the immune response. The GonaCon™ vaccine, which incorporates the AdjuVac™ adjuvant, could prove useful as part of an integrated management plan for overabundant wildlife species.

Scientists at NWRC are also developing safe, effective, and economical infertility agents for other wildlife species, including prairie dogs, Canada geese, and other mammals and birds. Ongoing studies are evaluating several contraceptive agents, including diazacon and nicarbazin in birds, and a range of compounds in mammals. In addition, NWRC scientists are testing the stability and viability of an oral vaccine in a variety of formulations to find the best

Major Research Accomplishments:

- WS developed a new adjuvant (AdjuVac™), which facilitated the creation of a new, GnRH-based, single-injection immunocontraceptive vaccine called GonaCon™.
- WS conducted numerous studies on the safety, efficacy, and practicality of the GnRH vaccine on several wildlife species including California ground squirrels, Norway rats, feral cats and dogs, baboons, burros, swine, horses, and deer.
- WS is conducting several laboratory and field studies to evaluate the use of diazacon as a mammalian and avian contraceptive.

method for delivering infertility agents to free-ranging animals.

Field Studies—NWRC has received an Investigational New Animal Drug (INAD) permit for GnRH injectable vaccines. This permit allows NWRC researchers and their collaborators to ship and test the vaccines on both captive and free-ranging animals. Tests of the GnRH vaccine are ongoing in several states and countries, involving a wide range of wildlife and feral species.

Groups Affected by These Problems:

- Urban and suburban residents
- Airports, airlines, airline passengers
- Motorists, pedestrians
- Farmers
- Ranchers/Livestock producers
- Natural resource managers
- Landscapers
- Pet Owners

Major Cooperators:

- Cornell University
- Pennsylvania State University
- University of Florida
- Colorado State University
- University of Sao Paulo, Brazil
- Idaho Department of Fish and Game
- Florida Department of Agriculture and Consumer Services
- U.S. Army
- Wildlife Services Operations personnel
- University of Pittsburgh

Selected Publications:

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- Levy, J. K., Miller, L. A., Crawford, P. C., Ritchey, J. W., Ross, M. K., and Fagerstone, K. A. 2004. GnRH immunocontraception of male cats. *Theriogenology* 62:1116-1130.
- Miller, L. A., Rhyan, J., and Killian, G. J. 2004. GonaCon, a versatile GnRH contraceptive for a large variety of pest animal problems. In: Timm, R. M., Gorenzel, W. P. eds. *Proceedings of the 21st Vertebrate Pest Conference*, 1-4 March 2004, Visalia, CA. University of California, Davis, CA: 269-273.
- Yoder, C. A., Andelt, W. F., Miller, L. A., Johnston, J. J., and Goodall, M. J. 2004. Effectiveness of twenty, twenty-five diazacholesterol, avian gonadotropin-releasing hormone, and chicken riboflavin carrier protein for inhibiting reproduction in cottontail quail. *Poultry Science* 83:234-244.