

Wildlife Services

Protecting People
Protecting Agriculture
Protecting Wildlife

National Wildlife Research Center

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Contraceptive Technologies for Use in Wildlife Population and Disease Management



Contact Information:

Dr. Douglas Eckery
NWRC Headquarters
4101 LaPorte Avenue
Fort Collins, CO 80521
Phone: (970) 266-6164
FAX: (970) 266-6157
douglas.c.eckery@aphis.usda.gov
www.aphis.usda.gov/wildlife_damage/
nwrc/

Major Cooperators:

- Australia's Invasive Animal Cooperative Research Centre
- Colorado State University
- Florida Department of Agriculture and Consumer Services
- Florida Power and Light Company
- Innolytics, LLC
- National Park Service
- United Kingdom's Food and Agricultural Research Agency
- U.S. Air Force (Avon Park, Florida)
- University of Pittsburgh

Groups Affected by These Problems:

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

National Wildlife Research Center Scientists Study Wildlife Contraception

Wildlife Services' (WS) National Wildlife Research Center (NWRC) is the only Federal research organization devoted exclusively to resolving conflicts between people and wildlife through the development of effective, selective, and socially responsible 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 carry a variety of diseases (e.g., plague, hantavirus) and damage rangelands and crops, resulting in the loss of millions of dollars in agricultural production. Overabundant feral horses in several western states degrade the quality of the habitat and create ecological and political problems. Stray dogs in many countries pose a potential public health risk, primarily due to bite injuries and the spread of rabies.

The goal of NWRC's wildlife contraceptive research is to develop injectable and oral contraceptives to manage overabundant wildlife populations. In 2009, APHIS successfully registered with the U.S. Environmental Protection Agency the first immunocontraceptive vaccine for wildlife. The single-shot, multi-year vaccine called GonaCon™ Immunocontraceptive Vaccine (GonaCon) was initially registered for use in female white-tailed deer, especially in urban and suburban areas where traditional lethal options are limited. Research has shown GonaCon to be an effective reproductive inhibitor in many other mammal species including elk, feral horses, bison, prairie dogs, ground squirrels, and feral dogs, and cats. Future NWRC research with GonaCon likely will involve studies to support expanded registration to other species, to develop oral delivery systems, and to prevent transmission of wildlife diseases. Wildlife contraceptives, such as GonaCon, can be used in conjunction with other tools in an integrated program to manage local, overabundant wildlife species.

Applying Science and Expertise to Wildlife Challenges

Use of GonaCon on Wild Horses—Overpopulation of wild horses and burros is a significant concern in the United States, as these animals can overgraze native plant species and compete with livestock and local wildlife for food and habitat. The Bureau of Land Management (BLM) estimates that approximately 31,500 horses and 5,800 burros are roaming on BLM-managed rangelands in 10 Western States. The estimated current free-roaming population exceeds by nearly 11,000 the number that the BLM has determined can exist in balance with other public rangeland resources and uses. Current management options are limited with the majority of actions involving the removal of horses and burros from the range and either putting them up for adoption or holding them indefinitely in captivity. Wildlife officials need additional nonlethal methods to manage populations of wild horses. Administering immunocontraceptive vaccines to control the fertility of free-ranging horses is a potential option to manage overabundant local populations. In January 2013, GonaCon's registration was expanded to include its use to manage fertility in wild and feral horses and burros. The vaccine is available for use by employees of APHIS' WS and Veterinary Services programs, the U.S. Bureau of Land Management, the U.S. Fish and Wildlife Service, the U.S. National Park Service, the U.S. Department of Defense, Federally-recognized Indian tribes, State agencies responsible for wild or feral horse and burro management, public and private wild horse sanctuaries, or persons working under their authority. Delivery of the product is by hand injection, jab stick, or darting.



United States Department of Agriculture
Animal and Plant Health Inspection Service

Experimental Use Permit for GonaCon in Bison—Preliminary laboratory data indicate that GonaCon not only is an effective contraceptive in bison, but also potentially retards the spread of brucellosis, an infectious disease that affects bison, elk, cattle, and many other mammals. Consequently, WS and Veterinary Services initiated a joint field study in southern Colorado to evaluate the contraceptive efficacy and duration of GonaCon in bison under free-ranging conditions. The study complements an ongoing study in Montana that tests GonaCon as a means of slowing the spread of brucellosis in bison. If these studies demonstrate that GonaCon is effective in bison, APHIS will likely pursue a product registration from EPA.

Combined Rabies-Contraceptive Vaccines for Raccoons—NWRC scientists conducted preliminary tests to evaluate the feasibility of a combined rabies-GonaCon vaccine for use in raccoons. WS operations biologists vaccinate hundreds of raccoons and other medium-sized mammals annually in response to localized rabies outbreaks. However, in areas where raccoon populations are high, the risk remains high that rabies will continue due to the production of susceptible young. NWRC scientists investigated whether immunocontraception is feasible for controlling raccoon population densities while sustaining a high immune status within adult populations in urban areas where the risk of rabies is high. Thirty-two raccoons were inoculated with either GonaCon, the rabies vaccine IMRAB® or both vaccines to simulate trap-vaccinate-release procedures used by the WS Oral Rabies Vaccination Program. Results show GonaCon prevents pregnancy in raccoons without interfering with the development of rabies antibodies stimulated by IMRAB®. To comply with registration requirements, NWRC scientists are conducting a breeding experiment as a second method to evaluate the contraceptive. They also plan to evaluate if GonaCon is as effective in young-of-the-year raccoons as it appears to be in adult raccoons.

GonaCon Use in Black-Tailed Prairie Dogs—Management of prairie dogs includes toxicants, fumigants, barriers, and relocation. Nonlethal methods that allow the existence of prairie dogs but help to minimize damage related to population growth are preferred, especially in urban and suburban areas. Researchers evaluated the immune responses and health effects of captive and wild black-tailed prairie dogs injected with GonaCon vaccine. No adverse effects of GonaCon were noted on the animals' weight or blood chemistry. The antibody titers recorded in the animals indicate that GonaCon has the potential to contracept prairie dogs for 1 year or more in the field.

Selected Publications:

GIONFRIDDO, J. P., A. J. DENICOLA, and K. A. FAGERSTONE. 2011. Efficacy of GnRH immunocontraception of wild white-tailed deer in New Jersey. *Wildlife Society Bulletin* 35:142-148.

GIONFRIDDO, J. P., A. J. DENICOLA, L. A. MILLER, and K. A. FAGERSTONE. 2011. Health effects of GnRH immunocontraception of wild white-tailed deer in New Jersey. *Wildlife Society Bulletin* 35:149-160.

LEVY, J. K., J. A. FRIARY, L. A. MILLER, S. J. TUCKER, and K. A. FAGERSTONE. 2011. Long-term fertility control in female cats with GonaCon™, a GnRH immunocontraceptive. *Theriogenology* 76:1517-1525.

MASSEI, G., D. P. COWAN, J. COATS, F. BELLAMY, R. QUY, S. PIETRAVALLE, M. BRASH, and L.A. MILLER. 2012. Long-term effects of immunocontraception on wild boar fertility, physiology and behaviour. *Wildlife Research* 39:378-385.

SANDERS, D. L., F. XIE, R. E. MAULDIN, J. C. HURLEY, L. A. MILLER, M. R. GARCIA, R. W. DEYOUNG, D. B. LONG, and T. A. CAMPBELL. 2011. Efficacy of ERL-4221 as an ovotoxin for feral pigs (*Sus scrofa*). *Wildlife Research* 38:168-172.

YODER, C. A., B. A. MAYLE, C. A. FURCOLOW, D. P. COWAN, and K. A. FAGERSTONE. 2011. Feeding of grey squirrels (*Sciurus carolinensis*) with the contraceptive agent DiazaCon™: effect on cholesterol, hematology, and blood chemistry. *Integrative Zoology* 6:409-419.

YODER, C. A., and L. A. MILLER. 2010. Effect of GonaCon™ vaccine on black-tailed prairie dogs: immune response and health effects. *Vaccine* 29:233-239.

Major Research Accomplishments:

- APHIS was granted an EPA registration for the use of the GonaCon™ Immunocontraceptive Vaccine to manage fertility in wild and feral horses and burros. WS continues to conduct research to expand the vaccine's registration to other species.
- WS is investigating the use of GonaCon in conjunction with the rabies vaccine on raccoons and feral or stray dogs. The immunocontraceptive could reduce populations of these animals in certain areas, thus, decreasing the potential spread of the disease.
- WS requested an Experimental Use Permit from the EPA to conduct contraceptive research on free-roaming dogs on tribal reservations in the United States.
- WS found GonaCon to be effective at reducing fertility in black-tailed prairie dogs.