

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 in the management of overabundant wildlife species in situations where regulated sport hunting and other traditional management tools are impractical or prohibited by law.

NWRC's AdjuVac™ adjuvant is also a critical component of a wildlife immunocontraceptive vaccine developed from the zona pellucida (a protein layer that coats the egg) of pigs (porcine zona pellucida or PZP). NWRC has completed a cooperative service agreement with ImmunoVaccine Technologies (IVT), a company in Nova Scotia that manufactures SpayVac™, the PZP vaccine. NWRC and IVT will work together to gain regulatory approval for the use of SpayVac™, which incorporates NWRC's AdjuVac™ adjuvant, for wildlife contraception in the United States.

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 nicarbazine 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 method for delivering infertility agents to free-ranging animals.

Field Situations—NWRC has received Investigational New Animal Drug permits for PZP and GnRH injectable vaccines. These permits allow NWRC researchers and their collaborators to ship and test the vaccines on both captive and free-ranging animals. Tests of these

Groups Affected by This Problem:

- 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

vaccines are ongoing in several states and countries, involving a wide range of wildlife and feral species.

Selected Publications:

- Killian, G. J.; Miller, L. A.; Diehl, N. K.; Rhyan, J.; Thain, D. 2004. Evaluation of three contraceptive approaches for population control of wild horses. 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: 263-268.
- Levy, J. K.; Miller, L. A.; Crawford, P. C.; Ritchey, J. W.; Ross, M. K.; Fagerstone, K. A. 2004. GnRH immunocontraception of male cats. *Theriogenology* 62:1116-1130.
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- Yoder, C. A.; Andelt, W. F.; Miller, L. A.; Johnston, J. J.; Goodall, M. J. 2004. Effectiveness of twenty, twenty-five diazacholesterol, avian gonadotropin-releasing hormone, and chicken riboflavin carrier protein for inhibiting reproduction in coturnix quail. *Poultry Science* 83:234-244.
- Killian, G. J.; Miller, L. A.; Rhyan, J.; Dees, T.; Perry, D.; Doten, H. 2003. Evaluation of GnRH contraceptive vaccine in captive feral swine in Florida. In: Fagerstone, K. A.; Witmer, G. W., eds. Proceedings of the 10th wildlife damage management conference; 6-9 April 2003; Hot Springs, AR. Fort Collins, CO: The Wildlife Damage Management Working Group of The Wildlife Society: 128-133.
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- Miller, L. A. 2002. Reproductive control methods. Pages 701-704 In: Pimentel, D., ed. *Encyclopedia of pest management*. New York: Marcel Dekker.
- Miller, L. A.; Killian, G. J. 2002. In search of active PZP epitope in white-tailed deer immunocontraception. *Vaccine* 20:2735-2742.
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- Miller, L. A.; Fagerstone, K. A. 2000. Induced infertility as a wildlife management tool. In: Salmon, T. P.; Crabb, A. C., eds. Proceedings of the Nineteenth Vertebrate Pest Conference. 6-9 March 2000; San Diego, CA. Davis, CA: University of California, Davis: 160-168.
- Miller, L. A.; Johns, B. E.; Killian, G. J. 2000. Immunocontraception of white-tailed deer with GnRH vaccine. *American Journal of Reproductive Immunology* 44:266-274.