

United States
Department of
Agriculture

Animal and
Plant Health
Inspection
Service

**Wildlife
Services**

FY 2004

Avian Diseases: Carriage of Bacterial Pathogens by Canada Geese and Blackbirds

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National Wildlife Research Center Scientists Examine Goose Impacts on Humans and the Environment

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 acceptable methods, tools, and techniques.

Disease transmission by free-ranging wild birds, such as Canada geese, blackbirds and pigeons is of increasing concern in the areas of public health and safety and agricultural production. Rapidly increasing populations of urban Canada geese are contaminating recreational areas with pathogenic bacteria that may pose human-health risks. Blackbirds and pigeons may also carry and disseminate emerging pathogenic bacteria that could affect livestock at confined animal feeding operations and dairies.

Applying Science and Expertise to Wildlife Challenges

Public Health and Safety—NWRC scientists have received numerous requests for information on the impact of waterfowl, specifically Canada geese, on agricultural production and public health and safety. The focus of this research project is to understand and develop management methods and recommendations to reduce the impact of Canada geese as carriers of disease, parasites, and noxious weeds. Canada geese can affect human health and safety in



urban landscapes and animal health in agricultural landscapes. This research is critical in order to evaluate risks and develop Ecological Assessments related to goose management.

Urban Landscapes—Fecal samples from Canada geese were collected throughout the year from a number of sites throughout the United States. This study characterized the prevalence of *Escherichia coli* serogroups (salmonella, listeria, and campylobacter) in Canada geese. The overall prevalence for *E. coli* ranged from 2 percent during the coldest time of the year to 94 percent during the warmest months of the year. During March through July, when nonmigratory geese dominated the local goose population, the prevalence of enterotoxigenic (ETEC) forms of *E. coli* was 13.0 percent. During the same period, the prevalence of enterohemorrhagic (EHEC) forms was 6.0 percent, while prevalences for enteroinvasive (EIEC) and enteroagglomerative (EAEC) forms were 4.6 and 1.3 percent, respectively. All samples positive for *E. coli* were examined for genes coding for virulence factors, including: SLT-I, SLT-II, eae, hly-A, K1, LT, STa, STb, CNF1, and CNF2. Prevalence for salmonella was less than 1 percent, while prevalence for listeria in goose feces ranged from 8-12 percent. The prevalence for campylobacter ranged between 0-60 percent depending upon the sampling location. These data will prove useful in focusing attention on the risks that increasing populations of urban Canada geese may pose to public health.

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Major Research Accomplishments:

- WS demonstrated that the chemical, nicothiazolamine, has potential as a reproductive inhibitor for Canada Geese.
- WS demonstrated that red lasers are effective in hazing Canada geese.
- WS demonstrated the presence of human pathogenic *E. coli*, *Listeria*, and *Campylobacter* bacteria in goose feces.

Agricultural Pastures—Scientists are gathering information on the ability of geese to act as carriers of pathogens that can infect humans in urban areas and livestock, such as cattle, sheep, and horses, in agricultural landscapes. The study is also evaluating the potential for geese to act as carriers of plant parasites and noxious weeds that can economically impact agricultural production and horticultural commodities, such as truck crops and turf. Producers spend considerable sums of money to eliminate weed species and pathogens from agricultural fields, only to have the fields re-inoculated by goose flocks. In addition to the cost, the constant chemical treatments needed to keep fields weed and pest free place a burden on the environment.

Dairies—Disease factors that affect milk production in dairy cows are of serious economic and public health concern. Besides veterinary approaches to herd health, limiting sources of infections by increasing farm biosecurity is a high priority for producers. NWRC scientists documented the role that pigeons may play as carriers of *E. coli* and salmonella. On-going studies are now focusing on the likelihood of pigeons and blackbirds as carriers of these pathogens between farm sites. At issue is an evaluation of whether bird control is economical when biosecurity issues are considered in addition to feed loss prevention.

Groups Affected by This Problem:

- Airports
- Airlines
- Airline passengers
- Citizens using recreational facilities
- Golfers
- Farmers
- Livestock producers
- Natural resource managers

Major Cooperators:

- USDA's Veterinary Services' National Veterinary Services Laboratories
- Colorado State University's Department of Environmental Health
- Pennsylvania State University, *E. coli* Reference Center

Selected Publications:

- Blackwell, B. F.; Bernhardt, G. E. 2004. Efficacy of aircraft landing lights in stimulating avoidance behavior in birds. *Journal of Wildlife Management* 68:725-732.
- Clark, L. 2003. A review of pathogens of agricultural and human health interest found in Canada Geese. 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: 326-334.
- Kullas, H.; Coles, M.; Rhyon J.; Clark, L. 2002. Prevalence of *Escherichia coli* serogroups and human virulence factors in feces of urban Canada geese (*Branta canadensis*). *International Journal of Environmental Health Research* 12:153-162.
- Stahl, R. S.; Johnston, J. J. 2002. High performance liquid chromatography-based determination of nicarbazin in waterfowl. *Journal of Chromatography* 775:103-108.
- Johnston, J. J.; Goodall, M. J.; Hurley, J. C. 2001. Determination of diazacon in quail and quail serum by ion pair reversed-phase chromatography. *Journal of AOAC International* 84:634-639.
- Primus, T. M.; Kohler, D. J.; Goodall, M.; Yoder, C.; Griffin, D.; Miller, L.; Johnston, J. J. 2001. Determination of 4,4'-dinitrocarbanilide (DNC), the active component of the antifertility agent nicarbazin in chicken, duck, and goose plasma. *Journal of Agricultural and Food Chemistry* 49(8):3589-3593.
- VerCauteren, K. C.; Pipas, M. J.; Tope, K. L. 2001. Evaluations of nicarbazin-treated pellets for reducing the laying and viability of Canada goose eggs. In: Brittingham, M. C.; Kays, J.; McPeake, R., eds. *Proceedings of the Ninth wildlife damage management conference*; 5-8 October 2000; State College, PA. University Park, PA: Pennsylvania State University: 337-346.