

Applicant Declaration

I _____

(print name)

of the Township of Southwold in the County of Elgin in the Province of Ontario in this action, MAKE AN OATH AND SAY (or *AFFIRM*);

- 1) The information contained in this application and other attached documentation is true to the best of my knowledge.
- 2) I have reviewed the following attached documents:
 - OMAFRA Factsheet titled "Raise Healthy Small Flock Poultry";
 - Reviewed the OMAFRA Factsheet titled "Rodent Control in Livestock and Poultry Facilities";
 - Reviewed the Ministry of Health Factsheet titled "Reducing Health Risks Associated with Backyard Chickens".
- 3) I understand and agree to comply with all the regulations contained in the Backyard Hens By-law 2024-52, including but not limited to:
 - A maximum of six (6) backyard hens shall be allowed on each permitted property.
 - All backyard hens shall be at least four (4) months old.
 - The keeping of roosters is strictly prohibited.
 - The slaughtering of backyard chickens/hens on the property is prohibited.
 - The selling of eggs, manure, meat or other products derived from backyard chickens/hens is prohibited.
 - A backyard hen coop shall be provided that has:
 - 1) A maximum ground floor area of 9.0 m²
 - 2) At least 0.37 m² of floor area for each hen;
 - 3) A maximum height of 4.5 m.

- The backyard hen coop and manure storage area, exclusive of the outdoor enclosure, shall not cumulatively exceed an area of 10 m².
- All backyard hen coops shall be a fully enclosed weatherproof structure or enclosure with ventilation and a heat source, built to prevent any rodent(s) from harbouring underneath or within its walls and to prevent entrance by any other animal. The interior shall include:
 - 1) At least one nest box for egg laying;
 - 2) At least one perch giving 0.3 m of space per hen;
 - 3) At least one food and water container.
- The backyard hen coop shall have a heat source that is a Canadian Standards Association (CSA) rated product and meets the Electrical Safety Authority (ESA) standards upon installation. It is the owner's responsibility to follow the manufacturer's instructions for the heat source to ensure proper use.
- All backyard hen coops must be kept in a clean and sanitary condition at all times, free of vermin, obnoxious smells and substances and in good repair.
- All backyard hen coops and outdoor runs shall be secured against the entry of predators.
- Backyard hens must be provided with food and clean water at all times, shelter, light, and ventilation to assist in keeping the hens in good health. Food and water shall be kept in solid, rodent proof and weather proof containers. Uneaten feed shall be removed in a timely manner.
- All stored manure shall be covered by a fully enclosed container. No more than three (3) cubic feet of manure shall be stored. All other manure not used for composting or fertilizing shall be removed daily from the hen coop and outdoor run.
- All backyard hens must be kept securely in a coop or outdoor run at all times. Backyard hens are not permitted to run at large.
- The backyard hen coop must be locked from sunset to sunrise.

DECLARED before me at
Township of Southwold in the County of Elgin in the Province of Ontario this day of

_____, 20____
(Month) (Year)

(Signature of Applicant)

A Commissioner of Oaths

Personal Information on this form is collected under the authority of the Municipal Freedom of Information and Protection of Privacy Act, R.S.O. 1990, c. M56, as amended. Inquiries about the collection of personal information should be directed to the Township CAO/Clerk

Raise Healthy Small Flock Poultry

Introduction

Many people in Ontario own small flocks of poultry, such as:

- backyard chickens or other birds raised for meat and/or eggs
- hobby birds
- show/ornamental birds
- sport birds
- pet birds

Learning how to care for your birds is critical to their health and well-being. Disease prevention is one of the most important ways that you can help your birds.

Prevent and spot disease

Avian influenza and other diseases are an ongoing concern for the entire poultry industry, and the risk of disease transmission and outbreak is constantly present. As a small flock owner, it is important for you to use biosecurity measures to keep your birds healthy and to help stop the spread of disease. Biosecurity can be as simple as:

- learning how to spot the signs of disease
- keeping barns, cages, egg trays, feed and water dishes and all other equipment clean and disinfected
- separating new and returning birds from your other birds until you are sure they are disease-free
- keeping wild birds and other animals away from your birds, and away from your birds' feed and drinking water as wild migratory birds can carry disease and are a big risk to your birds

If you think a serious disease is present you should discuss it with your veterinarian, the Canada Food Inspection Agency or the Ministry of Agriculture, Food and Rural Affairs (OMAFRA). Reporting a disease will help authorities track diseases and help protect the whole poultry population.

Ways to limit the spread of disease

As a bird owner, you can help stop the spread of disease to other birds. Here are some ways you can do that:

- don't transport birds showing signs of disease

- have dedicated clothing and footwear meant only for being around your birds, and wear these clothes when you tend your flock
- don't take diseased birds to auctions, shows or fairs, or to any other place with other birds
- don't transport birds across provincial boundaries if they might be sick and/or when disease events are reported in Ontario
- print the "Is Your Bird Sick" postcard or the "Stop! Is Your Bird Showing Signs of Disease" poster and share at your next meeting or event

In addition to disease prevention, the health and well being of your birds can also be improved through better biosecurity practices. The following simple, inexpensive biosecurity recommendations can be very effective in preventing a serious disease outbreak and enhance overall bird health.

Restrict visitors and observe proper hygiene

Contaminated equipment and people can introduce many disease-causing agents, such as bacteria and viruses, to your flock. These microscopic organisms can be carried on boots, clothing and vehicles, even if they appear clean.

Good practices include:

- Restrict contact with your birds to those people caring for them. If you allow visitors, provide them with clean coveralls and boots.
- Do not allow people who own their own birds, or who have recently been in contact with other birds (for example, those who have visited another flock or attending a bird show) near your birds. To reduce the risk of introducing diseases to your flock, ensure that people caring for your birds (staff or volunteers) do not have birds of their own or attend events where birds are present.
- Wear separate clothing and footwear when dealing with your birds. Keep them at the entrance to the structure or enclosure.
- Wash and disinfect boots and any equipment that comes in contact with the birds or their droppings, such as shovels, scoops and brooms. Clean cages, food and water surfaces daily.
- Wash your hands thoroughly before and after dealing with your birds.

Prevent contact with wild birds

Wild birds carry many diseases, including avian influenza. Minimizing contact with wild species and their droppings will help protect your birds from these diseases.

Keep your birds in a screened-in area or preferably an enclosed structure where they do not have contact with wild birds. Screen all doors, windows and vents, and keep them in good repair.

Do not use water that may be contaminated with wild bird droppings, such as pond water, for your birds. Test your water at least once a year and use appropriate water sanitation such as chlorine. Keep feed in a tightly sealed container, protected from wild birds.

Practice proper rodent control

Rats and mice can spread disease to your birds, spoil feed, cause property damage and kill chicks, poults and other young birds. Mice can enter an enclosure through a hole the size of your little finger, and rats through a hole the size of your thumb.

Ways to control rodents include:

- Monitor your enclosure regularly for signs of rodents, such as droppings or chewed equipment. Mice will live in buildings once they gain entry, while rats live outside and enter looking for food.
- Clean up all garbage and debris surrounding your birds' enclosure, and keep tall grass and weeds mowed.
- Store feed in tightly sealed containers that a rodent cannot chew through, such as a steel garbage can with a tight-fitting lid or an old freezer.
- Place bait stations around the exterior of your poultry house to help control rodent populations.

Don't bring disease back to your flock

Mixing birds of different species and from different sources increases the risk of introducing disease to your flock. It is preferable to keep only birds of similar age and species together (all in/all out).

Try to:

- Minimize contact between groups by keeping them in separate locations if multiple ages and/or species are kept.
- Get complete background information, including a history of any diseases and vaccinations, for new birds added to your flock. Some vaccines, including some of those used to control infectious laryngotracheitis (ILT), can cause disease in unvaccinated birds. Consult your veterinarian regarding proper vaccination procedures.
- Keep new or returning birds separate (quarantined) for at least 2-4 weeks after returning home, and monitor them for signs of illness. Clean and disinfect cages and equipment used for these birds. Use separate clothing, footwear and equipment for quarantined birds, and handle them last. If the same equipment and clothing must be used, clean and disinfect them before and after handling the birds.

- Avoid sharing equipment and supplies with other bird owners. If this cannot be avoided, clean and disinfect the equipment before and after each use.

Practice proper deadstock management

Poor management of deadstock (of any species) draws scavengers like turkey vultures, coyotes and foxes to your farm. Diseases including High Pathogenic Avian Influenza (HPAI) can be brought onto your farm by both avian and other scavengers.

Proper deadstock management and biosecurity practices reduce the risk of disease spreading to your farm, spreading to wildlife or disease spreading to your neighbour's farms.

Things to remember:

- Do not cross contaminate clothing or equipment when handling deadstock.
- Do not leave any deadstock directly outside your barn. Move deadstock directly to your deadstock disposal site to prevent scavengers from accessing it and potentially spreading the virus.
- If you see scavengers on your property, your disposal site is not being managed properly.

Recognize and report any illness

Early detection is critical to successfully dealing with a disease outbreak.

If your birds show signs of disease, such as depression, abnormal egg production or feed consumption, sneezing, gasping, a discharge from the nose or eyes, diarrhea or sudden death, call your local veterinarian immediately.

Dispose of dead birds quickly using an approved method, such as burial or composting. Consult your veterinarian first, as he or she may wish to collect samples for laboratory diagnosis.

Raising poultry species, either for food or as a hobby, is part of Ontario's agricultural heritage. However, to minimize the risks this poses to food safety and to the commercial poultry industry, bird owners should recognize and follow good biosecurity practices.

Rodent Control in Livestock and Poultry Facilities

B. Lang, A. Dam and K. Taylor

Factsheet

ORDER NO. 13-057 AGDEX 400/680 SEPTEMBER 2013
(replaces OMAF Factsheet of the same name, Order No. 10-077)

Rats and mice have long been a problem on farms where food and nesting sites are plentiful. These animals consume and contaminate food destined for livestock and other animals, as well as humans. Each rat on a farm will eat, spoil or damage approximately \$25 worth of grain per year. The adaptability and agility of these animals make getting rid of them particularly difficult. Mice are capable of running up a vertical surface, negotiating a wire like the finest circus performer and can easily jump to a height of 30 cm (12 in.) from a flat surface.

WHY CONTROL RODENTS?

Damage comes in many forms:

- **Damage to buildings.** Mice and rats will damage wood and electrical wiring, which can be a fire hazard.
- **Destruction of insulation.** Many livestock and poultry facilities show serious deterioration within 5 years. Associated with this damage are costs for re-insulation, increased energy costs and poorer feed conversions by animals.
- **Feed consumed.** A colony of 100 rats will consume over 1 tonne of feed in 1 year.
- **Feed contaminated.** A rat can contaminate ten times the amount of feed it eats with its droppings, urine and hair. A rat produces 25,000 droppings per year, a mouse 17,000. The U.S. Department of Agriculture estimates that the equivalent of more than \$2 billion in feed is destroyed by rodents each year.
- **Biosecurity.** Rodents are recognized as carriers of at least 45 diseases, including salmonellosis, pasteurellosis, leptospirosis, swine dysentery, trichinosis, toxoplasmosis and rabies. Mice and rats can carry disease-causing organisms on their feet, increasing the spread of disease.

UNDERSTANDING RODENTS

Mice and rats have tremendous breeding potential. One female mouse can give birth to 5–10 litters per year, yielding five to six young per litter. The gestation period is a mere 19–21 days. These babies are sexually mature in 6–10 weeks. The average female mouse lives to 9 months of age.

Under ideal situations, a pair of rats and their offspring can produce 20,000,000 young in 3 years. One female rat is capable of producing another 22 breeding females in 1 year (assuming a 50:50 male/female ratio of offspring), which mature within 3 months.

Rats and mice have poor eyesight but excellent senses of smell, taste, touch and hearing. They do not like open areas and prefer contact with walls and other objects. They do not range far from the nest. The range for rats is up to 45 m (148 ft), for mice 9 m (30 ft). Rats are extremely apprehensive about new objects and will avoid them for several days. Leaving a trap or bait station out for about 5 days is necessary to ensure acceptance. Mice quickly accept new objects. These tendencies become very important when designing baiting or trapping programs.

DOES YOUR FARM HAVE A PROBLEM?

Producers should not be embarrassed to admit they have a rodent problem. Surveys in Ontario indicate that 80% of poultry producers and 89% of swine producers have rodent problems. Chances are, rats and mice are a problem on your farm. The embarrassment and costs occur if something is not done to confront the problem.

Monitoring your barns is an important step in preventing and/or controlling rodent populations. Traditional rodent control methods such as baiting and trapping can also be used as a monitoring tool. Thorough record-keeping of bait disappearance can warn farmers if their rodent population is increasing. This is especially important in the fall, when rodents start to look for suitable wintering sites. Be aware that bait can become stale and mouldy, and must be refreshed often to prevent bait aversion and maintain the effectiveness of your monitoring program.

The following are signs of rodent infestation:

- **Sounds:** Gnawing, climbing noises in walls, squeaks.
- **Droppings:** Found along walls, behind objects and near food supplies.
- **Burrows:** Rat burrows are indicated by fresh diggings along foundations, through floorboards into wall spaces.
- **Runs:** Look for dust-free areas along walls and behind storage material.
- **Gnawing marks:** Look for wood chips around boards, bins and crates. Fresh gnawing marks will be pale in colour.
- **Rodent odours:** Persistent musky odours are a positive sign of infestation.
- **Visual sighting:** Daylight sighting of mice is common. Rats are seen in daylight only if populations are high. Quietly enter your barn at night, wait in silence for 5 minutes and listen for the sound of rodent activity. Look around with a powerful flashlight; rat eyes will reflect the light.
- **Smudge marks:** These may be found on pipes or rafters where dirt and oil from their fur leave a greasy film.

It is a generally accepted rule of thumb that there are approximately 25 mice or rats for every one that is seen. If you see rats and mice during daylight hours, it may indicate a severe infestation, as the population and feeding pressures are so high that juveniles are forced to forage during the day.

IS IT A RAT OR A MOUSE PROBLEM?

Since rats and mice require different control strategies, determine whether the problem is rats or mice (Table 1). The simplest way to differentiate between the types of infestation is by examining the droppings. Mouse droppings are black and rice-kernel sized, whereas rat droppings are black and bean-sized.

Table 1. Physical and behavioural characteristics of adult rats and mice

Characteristic	Norway Rat	Mouse
Size (including tail)	42 cm (16.5 in.)	16 cm (6 in.)
Average weight (adult)	500 g (18 oz)	20 gm (0.7 oz)
When active	nocturnal	nocturnal
Sight	poor: 1.5 m (4.9 ft)	poor: 1 m (3 ft)
Smell, touch, taste	excellent	excellent
Hearing	highly accurate	highly accurate
Range from nest	45 m (148 ft)	9 m (30 ft)
Fear of new objects	3–7 days	3 min–5 hr
Water requirements	daily	2–4 days without
Food per day	28 g (1 oz)	3 g (0.1 oz)
Water	57 g (2 oz)	3 g (0.1 oz)
Favourite foods	rolled oats, meat, fish, vegetable oil	grains, rolled oats, sugar, raisins
Droppings	bean size	rice size
Minimum width for entrance (hole diameter)	12 mm (0.5 in.)	6 mm (0.2 in.)
Can chew through (given edge to gnaw on)	rubber, aluminum, cinder blocks, plastic, wool	same as rats

WHAT DO MICE AND RATS LIKE TO EAT?

Rats and mice can be considered to be omnivorous. Given a choice, they prefer cereal grains. Rats eat meat when available. However, when food supplies are scarce, they will eat almost anything, including plaster and even soap or animal carcasses.

Rats and mice eat every day and prefer a water supply. Rats usually drink every day, but mice can survive several days without water. A water source for mice can be as small as the condensation formed on cold water pipes.

RODENT CONTROL (THE PRINCIPLES)

Rodent control requires an integrated pest-management strategy involving many techniques. The producer's first objective should be to prevent, or at least greatly reduce, rodent numbers through management programs that eliminate entrance to the facility, nesting sites for the rodents, food supplies and water. Populations build when food, water and nesting sites are readily available.

Habits and Biology

To control mice and rats, we have to understand their habits and biology first. See Table 1.

- Both are highly reproductive and extremely capable of surviving in all kinds of conditions.
- On farms, mice and rats will be near a food source such as barns, granaries, livestock buildings and silos.
- Rats and mice can climb and jump. Rats can jump vertically as high as 91 cm (36 in.) and horizontally as far as 122 cm (48 in.).
- Mice and rats can climb brick and other rough walls, and travel along utility wires.
- Rats can squeeze through an opening as small as 1 cm (½ in.) and mice as small as 0.6 cm (¼ in.), or less, in diameter.
- Both mice and rats are active at night, particularly right after dusk.
- Rats are smart and tend to avoid new objects. Therefore, it may take a few days for traps and baits to work. In contrast, mice are fairly inquisitive and will accept new baits and traps readily.

Rodent-Proofing Farm Buildings

Proper construction and maintenance of buildings helps prevent rodents from entering your barn. Initial construction footings should extend 0.5 m (19 in.) into the ground, with an apron that extends 0.2 m (8 in.) outward. This prevents rodents from burrowing into your building. To prevent frost damage, footings may have to be deeper. Examine your building at least once a year for possible entryways for rodents. Remember, a mouse needs only a 0.6 cm (¼ in.) opening to gain access; rats need a 1 cm (½ in.) opening. As a general guideline, mice can enter an enclosure through a hole the size of your little finger, and rats through a hole the size of your thumb. Cracks around door frames, under doors, broken windows, water and utility hook-ups, vents and holes surrounding feed augers are potential points of entry. Use coarse steel wool, hardware cloth or sheet metal to cover/fill any entrances. Do not use plastic, wood or insulation, as rodents simply gnaw their way through.

When constructing walls, ensure that sheeting lies flush to the wall studs rather than on strapping. This keeps nesting sites confined to a single section between studs rather than allowing complete access to all wall spaces. For further information, see

Plan No. M 9451 of the Canada Plan Service Series, *Rodent and Bird Control in Farm Buildings*.

A well-maintained structure is your first defence against rodents. Most rodents enter your barn directly from the fields and then the population builds. It is important to maintain good sanitation outside the barn. Eliminate vegetation 1 m (3 ft) around buildings and replace with crushed rock as rodents cannot tunnel through this material. Clean up spilled feed, remove loose wood, garbage, etc. Do not attract rodents from fields to your operation.

Eliminating Hiding Places and Nesting Sites

Rodents do not like to be exposed. Maintain sound housekeeping, eliminate loosely piled building materials, old feed bags, trash or anything else that a rodent can hide in or under. Keep piles of lumber and miscellaneous equipment 24–30 cm (9–12 in.) off the floor and at least 24 cm (9 in.) out from a wall. Look for entrances into double wall construction. Most rodents nest in the insulation of double walls. Block off all entrances into walls and destroy all nesting material.

Remove Food and Water

Eliminate water sources such as leaky taps, open water troughs, sweating pipes and open drains. Keep all feeds in rodent-proof bins, covered cans or metal hoppers. Reduce feed spillage and immediately dispose of dead animals. Without readily available food and water, populations cannot build.

CONTROL OF EXISTING POPULATION

If there is already a rodent problem inside the barns, prevention alone won't solve the problem. In this case, consider a population-reduction program.

Snap Traps

For small populations, snap traps or box traps are very useful for eliminating rodents. Rats prefer fresh bacon, fish and meat, while mice favour cheese, peanut butter or seeds. Try several baits to find out which your rodents prefer. Rats are distrustful of anything new in their environment, so leave baited non-set traps out for 4–5 days to allow them to get used to the traps. Ensure that previous baits have been taken before actually setting the traps. If rats are the problem, use rat traps. If mice are the problem, use a mouse trap. Locate traps close to walls, behind objects, in dark corners, where you see droppings or gnaw marks. When trapping next to a

wall, set the trap at right angles to the wall with the trigger and bait closest to the wall. Orient multiple-catch traps with the entrance hole parallel to the wall. Live traps can work very well near runways used by mice and rats.

Glue Boards

Glue boards are very effective against mice and are the method of choice in locations where toxic baits are a concern. Glue boards will not work well if there is too much dust. Check glue boards and traps daily and remove and dispose of dead mice and rats. Abundant food supplies make baited traps less effective. Eliminate as many sources of food as possible before starting a program. For barns and poultry houses with moderate infestations, set 50–100 traps. The trapping program should be short and decisive to prevent trap shyness.

Wear rubber gloves when handling bait, bait stations, traps or dead rodents to prevent human scent transfer, accidental poisoning or disease transmission. Place the rodents in tightly sealed plastic bags.

Predators

Cats may limit low-level mouse or rat populations. However, if conditions are ideal for rodents, cats cannot eliminate a problem. Cats may introduce disease into a facility by bringing in rodents caught in fields. Cats will not be able to catch mice as quickly as they multiply.

Sound and Ultrasound Devices

These two methods may not be effective. Rodents may be frightened by strange noises in the first few days but then quickly become used to them. Sound devices may cause distress among commercial poultry flocks, as well as decreased production and increased injury/mortality.

Rodenticides (Toxic Baits)

All rodenticide products are poisonous to other animals. Always observe label precautions regarding use, handling and storage.

The Ontario Ministry of the Environment is responsible for regulating pesticide sale, use, transportation, storage and disposal in Ontario. Ontario regulates pesticides by placing appropriate education, licensing, and/or permit requirements on their use, under the *Pesticides Act* and Regulation 63/09.

Table 2. List of approved active ingredients for rodent control in Ontario*, August 2013

Active Ingredient	Ontario Approved Class(es)
brodifacoum	4, 6
bromadiolone	4, 5, 6
bromethalin	3
cellulose from powdered corn cobs	4, 5, 6
chlorophacinone	4, 5, 6
difethialone	4, 6
diphacinone	4, 5, 6
warfarin	3, 4, 5, 6
zinc phosphide	3

*excludes Class 1 products used by manufacturers
Source: Ministry of the Environment website, 2013

All pesticides must be used in accordance with requirements under the *Pesticides Act* and Regulation 63/09 (available at www.ontario.ca/e-laws or call the ServiceOntario Publications toll-free number 1-800-668-9938 or 416-326-5300).

Ontario farmers, as defined by the *Pesticides Act* and Regulation 63/09, may purchase and use Class 4, 5 and 6 pesticides for rodent control. Under Regulation 63/09 of the *Pesticides Act*, Ontario farmers must be certified to purchase and use Class 3 pesticides for rodent control on their farms. To be certified, a farmer must successfully complete the Grower Pesticide Safety Course. Certified farmers may also purchase Class 4, 5, and 6 products. Class 5 and 6 pesticides for rodent control can be used by homeowners.

Use rodenticides (Table 2) as both a control and preventative measure. There are two basic types of rodenticides: acute poisons and anti-coagulants. These can come in a variety of forms, such as pelleted, powdered and liquid. Anti-coagulants can be further classified into first and second generation. First generation anti-coagulants require rodents to feed over several days in order to acquire a lethal dose of the active ingredient, such as warfarin, diphacinone and chlorophacinone. Second-generation anti-coagulants may only require a single feeding to acquire a lethal dose, though animals may not die for several days. Second-generation active ingredients include brodifacoum, bromadiolone and difethialone. The active ingredient can be found beneath “guarantee” on the product’s label.

Rodenticide labels will provide the applicator with appropriate usage instructions. Rodenticides registered to be used in and around agricultural buildings must be within 15 m (49 ft) of the building, or 100 m (328 ft) if placed along a fence-line. Outdoor bait stations are mandatory if the rodenticide is “above ground” (i.e., accessible by children and non-target species such as pets, livestock and wildlife).

Both outdoor and indoor bait stations must be tamper-resistant. For example, they must have an access panel that can be closed securely and locked, in addition to other strict requirements. Requirements for bait stations are divided into different tiers depending on indoor vs. outdoor use and varying accessibility by children and/or non-target species. Additionally, if the bait station is placed along a fence-line, it must be securely fastened (e.g., nailed to a fence post or to the ground). More information about bait station tiers and their requirements can be found online at the Pesticide Management Regulatory Agency’s website (Pest Management Regulatory Agency, www.hc-sc.gc.ca/ahc-asc/branch-dirgen/pmra-arla/index-eng.php).

Farmers should be aware that it is prohibited to use commercial class, concentrated rodenticides (often mixed with solid or liquid bait) outdoors, with or without a bait station.

REFERENCES

Factsheet: Rodent Control. Solvay Animal Health, Inc.

The Veterinarian’s Guide to Managing Poisoning by Anticoagulant Rodenticides. Liphatech. 2001.

Ontario Ministry of the Environment. Pesticides.
www.ontario.ca/environment

Ontario Ministry of the Environment. Pesticide Product Information System.
www.ontario.ca/environment

Health Canada, Consumer Product Safety
www.hc-sc.gc.ca/cps-spc/pubs/pest/_fact-fiche/restriction-rodenticides/faq-eng.php

Pest Management Regulatory Agency.
<http://pr-rp.hc-sc.gc.ca/lr-re/index-eng>

This Factsheet was updated by Brian Lang, Dairy Cattle Production Systems Specialist, OMAF, Woodstock; Al Dam, Poultry Specialist, OMAF, Guelph; and Kathleen Taylor, Poultry Specialist Assistant, OMAF, Guelph.

Occasionally, rodents may develop bait shyness after being made sick but not killed by a rodenticide. The shyness develops to the bait carrier, e.g., grain, and not to the rodenticide. Simply use another formulated product or different attractant if bait shyness develops. For rats, pre-bait using baits without the poison for about 1 week to get them accustomed to the bait. Place baits in areas of high rodent activity. Many people under-bait in their control program. Baits should be 1–2 m (3–6 ft) apart for mice and 7–10 m (23–33 ft) for rats. Remove all uneaten baits and properly dispose of them after the poisoning program.

CONCLUSION

Elimination of rats and mice from livestock and poultry barns is extremely difficult. It is preferable for producers to prevent infestations from occurring. If a problem does exist, the options described in this Factsheet should be useful in limiting rat and mice populations. If problems persist, farmers may find advice from professional pest control personnel helpful. These professionals can assist with identifying entry/nesting sites. They can also provide advice on placement of bait stations, traps, baiting and bait monitoring.

FOR YOUR NOTES

FOR YOUR NOTES

Published by the Ontario Ministry of Agriculture and Food
and the Ministry of Rural Affairs

© Queen's Printer for Ontario, 2013, Toronto, Canada

ISSN 1198-712X

Également disponible en français

(Commande n° 13-058)



Agricultural Information Contact Centre:

1-877-424-1300

E-mail: ag.info.omafra@ontario.ca

www.ontario.ca/omaf

EVIDENCE BRIEF

Reducing Health Risks Associated with Backyard Chickens



2nd Edition: September 2023

Key Messages

- Backyard chickens can be found in rural and urban residences in Ontario and elsewhere.
- Backyard chicken owners' awareness of illness risks such as salmonellosis, and biosecurity measures is limited.
- Human illnesses and outbreaks have been linked to exposure to backyard chickens.
- Backyard chicken owners can reduce their risk of illness through a variety of measures such as:
 - hand washing before and after handling chickens, feeding them, and cleaning chicken coops
 - wearing dedicated clothing and shoes to avoid cross-contamination
 - refraining from kissing and snuggling live chicken
 - maintaining cleanliness of the premises (e.g. sanitizing equipment, removing wet manure)
 - preventing contact between backyard chickens and wild birds/animals
 - reporting illnesses in chicken flocks and seeking veterinarian expertise

Issue and Research Question

Chickens kept on residential property are commonly referred to as backyard chickens. Smith et al. define backyard chickens as domestic gallinaceous birds, excluding exotic pet birds, housed in urban, suburban or rural settings.¹

Keeping backyard chickens in rural or urban residences is not a new concept. Early poultry production in the United States (US) in the 1800s usually consisted of backyard poultry.² Today, backyard chicken owners may also develop emotional attachments to their flocks, viewing them as pets and practicing closer contact in some cases.³ A 2013 report from the United States Department of Agriculture (USDA) found a growing interest in ownership of backyard chickens in several US cities.⁴ An issue brief from the University of Minnesota also reported that the number of households keeping chickens in urban backyards in the US appears to be increasing.³

Ontario public health units and Public Health Ontario (PHO) have received inquiries about health risks associated with backyard chickens. In addition, a report by Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) indicates that poultry is a popular choice for urban producers who want to raise livestock in Ontario.⁵ Services to rent backyard chickens for private homes and long-term care homes are also available in Ontario.⁶ If this is indeed a trend, concerns about backyard chickens as sources of zoonotic diseases to humans may also increase,⁷ as well as the need for risk reduction strategies.

This Evidence Brief updates a previous review done in 2017 and focuses on the following questions:

- Are backyard chicken owners aware of the risk of infectious disease transmission from their flocks?
- What illnesses and outbreaks are associated with exposure to backyard chickens?
- What behaviours can increase the risk of illness from exposure to backyard chickens?
- What biosecurity measures can reduce the risk of human illness and outbreaks?

This Evidence Brief addresses questions regarding health risks from backyard chickens and ways to reduce those risks. It does not include noise, odour and the possible benefits of raising backyard chickens, which may be considerations for policy.

Methods

For the 2017 review, a literature search was conducted by PHO Library Services using MEDLINE, Embase, Academic Search Premier, Food Science Source and Scopus databases. The search was limited to literature published in English from 1946 to July 3, 2017. Search terms included: urban chicken, backyard chicken, domestic chicken, transmission, monitoring, infections, illness, outbreak, disease, biosecurity, knowledge, practice, attitude, and risk. The search yielded 1635 citations after duplicate records were removed. Titles and abstracts were screened for relevance. Additional information was identified through cited reference searching of full-text articles and through an external reviewer.

A grey literature search was also performed using Google on July 5, 2017, and the first 100 results were reviewed. Search terms included backyard chicken OR backyard poultry OR urban chicken OR backyard hen OR neighborhood poultry OR hobby hen OR hobby chickens OR household poultry. Papers were selected if they identified illnesses or outbreaks associated with exposure to backyard chicken, backyard chicken owners' awareness of health risks and risk reduction measures.

In February 2023, an updated literature search was conducted by PHO Library Services to identify new evidence on the search terms listed above, including highly pathogenic avian influenza (HPAI) and other pathogens in backyard chickens and small poultry flocks. Environment Complete was searched in addition to the same databases above. The search was limited to literature published in English from 2017 to February 2023. The search yielded 699 citations after duplicate records were removed. Titles and abstracts were screened for relevance to HPAI and other pathogens in backyard chickens/poultry or small non-commercial flocks, human cases from exposure to backyard chickens/poultry or small non-commercial flocks, and biosecurity measures. A grey literature search was also performed using a custom Google search in March 2023, and the first 50 results were reviewed.

A total of 66 records are included in this report. A detailed search strategy is available upon request.

Main Findings

Owners Have Limited Awareness of the Human Risk of Infectious Disease Transmission from Backyard Chickens

In general, studies have found limited awareness of the association between infectious disease risk and live poultry contact, as well as a lack of biosecurity measures among flock owners.⁸⁻¹⁴ New backyard chicken owners in Ontario may not be aware of these risks as information on enteric illnesses are not typically provided at point of selling in Ontario.⁶ This search identified a number of US and international based studies; the following highlights provide details:

- US based studies have found:
 - Inconsistent or minimal biosecurity practices. For example, a cross-sectional study of Colorado backyard chicken owners (n=317) found minimal biosecurity measures and high human contact with flocks. About 79% of individuals surveyed did not change into separate clothes before contact with chickens and about 95% did not report disinfecting or scrubbing their flock shoes before and/or after contact.¹ Another survey of 41 backyard flock owners in Maryland concluded that biosecurity practices were highly variable among flock owners.⁷
 - Variable awareness of the connection between salmonellosis and poultry,^{9,13,15} with one study finding that those who completed the survey in English (versus Spanish), sold or gave away eggs, and/or kept chickens for educational purposes for their children were more aware of the association between salmonellosis and poultry.⁹
 - One study showed a discordance between biosecurity measures stated to be used by backyard chicken owners versus what they actually practiced.¹³

Studies based in Europe (Finland, United Kingdom) have similarly found low awareness of the link between backyard chickens and human illness, and limited application of biosecurity measures.^{11,12}

Illnesses and Outbreaks Associated with Exposure to Backyard Chickens Have Been Reported

Infectious disease transmission is a known human health risk associated with backyard chickens. Salmonellosis and campylobacteriosis are the most frequent infections reported in relation to backyard chickens and live poultry exposure.^{3,13,16,17} Poultry can carry *Salmonella* in their intestines or eggs without symptoms of illness, which can be transferred onto feathers and the surrounding environment.³ Table 1 summarizes literature reviews of *Salmonella* outbreaks that were identified in our literature search.

Table 1. Outbreaks of Salmonellosis Associated with Backyard Chickens, 1990 – 2023*

Location	Year	Outbreaks (n)	Cases (n)	Details	Reference
US	1996 – 2012	45	>1581	Resulted in 221 hospitalizations, and five deaths.	Behravesh et al., 2014 ¹⁶
US	1990 – 2014	45	2057	Literature review of publicly available data sources for human infectious disease outbreaks associated with backyard chicken exposure. Authors recommended manure management, proper slaughter and disposal, veterinary care, permitting and consumer education to reduce the infectious disease risk associated with backyard poultry ownership.	Tobin et al., 2015 ¹⁸
US	1990 – 2014	53	2630	Literature review and search of multiple databases including PulseNet, the National Molecular Subtyping Network for Foodborne Disease Surveillance in the US, the Centers for Disease Control and Prevention’s (CDC) National Outbreak Reporting System. Keeping poultry inside households and kissing birds were some high risk practices reported.	Basler et al., 2016 ⁸
US	2017	10	1120	In 2017, there were 10 separate multistate outbreaks. These outbreaks included cases from 28 states and the District of Columbia. They resulted in 249 hospitalizations and one death.	US, CDC ¹⁹
US	2022	13	1230	In 2022, there were 13 separate multistate outbreaks. These outbreaks reported cases from 49 states, the District of Columbia, and Puerto Rico. Of 737 people interviewed, 59% had contact with backyard poultry prior to illness. Of 726 people with health outcome data available, there were 230 hospitalizations. Two deaths were reported (where data were available).	US, CDC ²⁰

*The peer-reviewed studies reported in Table 1 are literature reviews and may include data from the same outbreaks.

Concerns about avian influenza have increased recently with the circulation in North America beginning in late 2021 of a genetic group of H5N1 avian influenza viruses, which are highly pathogenic to chickens and can be transmitted in rare cases to humans.^{21,22} Currently, the likelihood of sustained human-to-human transmission of Influenza A(H5N1) remains low.^{23,24,25} However, globally, human infections with both low and highly pathogenic avian influenza have been reported from exposure to backyard flocks. The following reports summarize transmission of various avian influenza subtypes to humans following exposure to poultry:

- From 2020 to December 21, 2022, the WHO reported six human infections of HPAI (H5N1, clade 2.3.4.4b) internationally, including one case from the US in 2020 in a worker culling poultry.^{25,26}
- A recent World Health Organization (WHO) risk assessment reported three human cases of avian influenza (H5N1) from Cambodia (clade 2.3.2.1c) and China (clade 2.3.4.4b) and one case of avian influenza (H5N6) in China between January 27, 2023 to March 2, 2023.^{27,28}
- Previous human outbreaks of HPAI (H5N1, clade 2.2.2) from backyard poultry were recorded in Vietnam in 2007 and Thailand from 2007 to 2010.²⁹ It was found that 96% of human exposure to HPAI during the outbreak in Vietnam was through backyard poultry.
- A study assessing transmission of low pathogenic avian influenza (LPAI) influenza A (H9N2) from birds to humans in the context of backyard poultry farms in Vietnam was conducted from 2013 – 2015.³⁰ There were at least five cases of asymptomatic human infections. The authors noted that two of the five human cases were from households that experienced respiratory illnesses that coincided with study timelines.
- In 2018, LPAI (H9N2) circulated on a farm in China, infecting backyard chickens, two humans, and a cat.³¹ Reported symptoms among the two infected individuals included diarrhea, abdominal pain, and joint pain for one of the cases.
- According to the May 31, 2023 Public Health Agency of Canada’s emerging respiratory pathogen bulletin, nine cases of influenza A (H9N2) have been detected globally in 2023. However, no cases have been reported in Canada.²⁴

A key concern is wild bird populations transmitting avian influenza to backyard flocks.^{32,33} HPAI (H5N1) outbreaks in backyard flocks have been reported in the US and Canada (including southern Ontario) in 2022.^{22,34} Owners can then potentially become infected through exposure to backyard flocks.

In addition to outbreaks and illnesses associated with backyard chickens, a number of studies have found pathogens in backyard chickens such as *Salmonella*^{17,35,36}, *Listeria monocytogenes*³⁷, *C. gallinacean* (a chlamydial species with zoonotic potential)³⁹, and *T. infestans* (insect) infected with *T. cruzi* which can lead to Chagas disease⁴⁰; as well as ectoparasites (lice, fleas, mites).³⁸ Moreover, antimicrobial resistance genes have been found in *E.coli* from backyard poultry feces.⁴¹

Risk Reduction Measures may reduce the Risk of Zoonotic Infections in Humans

The above studies on human illnesses and outbreaks noted that human behaviour can increase the risk of infectious diseases and outbreaks. High risk behaviours include keeping poultry inside the house and having close contact such as holding or kissing poultry.^{3,8,18,34} Additionally, *Salmonella* spp. can contaminate the environment and spread infection when poultry faeces is used as fertilizer.⁴²

A recent study in Ontario showed that 8% of survey respondents with backyard chickens raised their chickens for meat.⁶ Slaughtering infected birds, especially in household settings, was noted to be a likely risk factor for avian influenza by the WHO.⁴³ This risk was demonstrated by sampling air in a laboratory simulation of the process of slaughtering chicken, which found release of droplets (>4 µm) and aerosols (1-4 µm) and raised the possibility of transmission if nearby individuals are unprotected.⁴⁴

Table 2 summarizes risk reduction (biosecurity) strategies backyard chicken owners may implement to reduce human infectious disease risk.

Table 2. Biosecurity Measures for Backyard Flocks

Biosecurity strategies	Biosecurity measures
Prevent contact with wild birds and other animals ^{29,45-52}	<ul style="list-style-type: none"> • Store feeds in sealed and waterproof containers • Ensure living space of backyard chickens is clean of feed and standing water • Chickens should be kept in an enclosed space such as a shed or barn • Avoid installing bird feeders, perches near backyard chicken space • Appropriately place scare devices (to repel wild birds) and replace damaged ones to ensure effectiveness • Keep housing secure from predators and other animals
Maintain cleanliness of the premises ^{3,8,18,29,34,36,47,48,50,52-54}	<ul style="list-style-type: none"> • Wash hands before and after handling backyard chickens, feeding them, and cleaning the environment • Regularly clean feed and water containers, ensuring that animal waste such as wild bird droppings are not present • Prevent and control rodents • Equipment that can be reused and contaminated should be cleaned and disinfected, rinsed well, and dried • Regularly remove manure, bedding and feed to reduce bacterial growth and flies • Properly compost poultry manure prior to use as a fertilizer • Promptly dispose of dead birds • Clean nest boxes regularly and ensure there is sufficient number of nest boxes and space per hen • Collect eggs as they are produced to minimize contamination* • Discard all cracked and heavily soiled eggs*

Biosecurity strategies	Biosecurity measures
Avoid cross-contamination ^{3,8,12,18,29,34,36,45,47,52,53,55}	<ul style="list-style-type: none"> • Acquire chickens from a reliable source • Keep different species of birds apart as mixing can introduce new diseases • Do not share equipment with other bird owners • When entering the space, use dedicated clothing when interacting with the flock and their living space • Do not slaughter poultry in the house • Ensure chicken roosts are away from nesting boxes and feeding stations* • Restrict contact between backyard chickens and pets
Avoid close contact with birds ^{3,8,18}	<ul style="list-style-type: none"> • Do not bring poultry inside the house • Refrain from kissing and snuggling poultry • Refrain from touching one's mouth, eating, or drinking around chickens
Segregate and monitor ^{47,51}	<ul style="list-style-type: none"> • Quarantine sick birds until recovered
Report illnesses and deaths ^{12,18,47}	<ul style="list-style-type: none"> • Contact a veterinarian or the local CFIA office if there is suspected illness in backyard chickens
System-level interventions ^{18,34,56–58}	<ul style="list-style-type: none"> • Educate flock owners on quarantine and hygiene measures to limit the introduction of new diseases to backyard flocks • Provide health-related information to potential poultry buyers before point of sale • Register households with poultry to enable communication in the event of outbreaks

*Personal communication from D Schwartz, 2023; unreferenced

In addition to the biosecurity measures mentioned above, the Canadian Food Inspection Agency (CFIA), OMAFRA and the Canadian Wildlife Health Cooperative provide specific guidance for quarantine and control measures for HPAI and backyard chickens, including:^{47, 48,59,60}

- Avoiding visiting backyard chickens for 14 days after visiting farms abroad and/or having contact with wild birds.
- New birds should be kept separate from the flock and monitored for 30 days.
- Birds that were present at shows or exhibits should be kept separate from the flock and monitored for 14 days.
- During an ongoing disease outbreak, avoid gatherings such as shows, sales, and swap meets.
- Dead wild birds on your property should be reported to the Canadian Wildlife Health Cooperative.

Bird owners should also stay vigilant and maintain hygiene measures while handling birds as it is possible to infect birds with viruses such as influenza and bacteria from humans.⁵¹ If a member of the household becomes ill with symptoms such as fever, cough, or sore throat, they should seek medical advice and avoid direct contact with the backyard chickens.⁶⁰ Backyard chicken owners have also been recommended to obtain seasonal influenza vaccination.⁴⁸ Pets (e.g., cats, dogs) can also be infected with avian influenza, e.g., during hunting or scavenging. Concerns about avian influenza or illness in pets should be brought to a veterinarian.^{59,60}

OMAFRA provides “Keeping Your Birds Healthy Resource Kits” for backyard chicken owners. It provides information on biosecurity, feed and water management, cleaning and disinfection, managing sick birds and disposal of sick birds.⁶¹ In addition, [Family Food Program](#) at Chicken Farmers of Ontario (CFO) provides information for members on promotion of bird health and disease management.⁶²

Discussion and Conclusions

Backyard chickens can be found in urban and rural residences in Ontario. Pathogens such as *Salmonella* spp., *Campylobacter* spp., *Listeria monocytogenes*, and different strains of avian influenza A have been found in backyard chickens and linked to human exposure and infection.

Close contact with backyard chickens may contribute to infectious disease transmission from birds to humans, even in the absence of illness in poultry.^{8,9,12,33,34} Close contact with and slaughtering of backyard chickens poses health risks to owners; education for flock owners on proper slaughtering processes may reduce this risk.^{8–14,63} Other biosecurity practices such as preventing contact between backyard chickens and wild birds/animals, maintaining cleanliness of the premises and hygiene (including hand hygiene), avoiding cross-contamination, segregating and monitoring sick birds, and reporting illnesses can reduce the risks of infection transmission to both birds and humans.^{27,36,47–55,60,64–66}

Implications for Practice

Human illness has been associated with backyard poultry, however, owner attention to biosecurity measures may reduce the risk. Informing potential backyard chicken owners of the risks and reinforcement of the importance of biosecurity measures can help to reduce risks for both owners, visitors and their flocks.

In considering backyard chicken policies, authorities may also consider noise, odour, community preferences, the risk of infection, and the possible benefits of backyard chickens.

References

1. Smith E, Reif J, Hill A, Slota K, Miller R, Bjork K. Epidemiologic characterization of Colorado backyard bird flocks. *Avian Dis.* 56(2):263-71. Available from: <https://doi.org/10.1637/9865-072811-Reg.1>
2. National Chicken Council. U.S. chicken industry history [Internet]. Washington, DC: National Chicken Council; 2012 [cited 2023 Apr 11]. Available from: <https://www.nationalchickencouncil.org/about-the-industry/history/>
3. Bailey T, Larson J. Backyard poultry: implications for public health and safety [Internet]. Minneapolis, MN: Food Policy Research Center; 2013 [cited 2023 Apr 11]. Available from: <http://conservancy.umn.edu/handle/11299/157625>
4. US Department of Agriculture. Urban chicken ownership in four U.S. cities [Internet]. Fort Collins, CO: US Department of Agriculture; 2013 [cited 2023 Apr 11]. Available from: https://www.aphis.usda.gov/animal_health/nahms/poultry/downloads/poultry10/Poultry10_dr_Urban_Chicken_Four_1.pdf
5. Ontario. Ministry of Agriculture and Rural Affairs. Urban agriculture business information bundle: poultry [Internet]. Toronto, ON: King's Printer for Ontario; 2023 [modified 2023 Mar 07; cited 2023 Mar 27]. Available from: <http://omafra.gov.on.ca/english/livestock/urbanagbib/poultry.htm>
6. Paphitis K, Metcalf D, Weese JS. Backyard chickens - a cross-sectional survey of current and prospective backyard chicken owners in Ontario (2019-2021). *Can Vet J.* 2023;64(1):54-62. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9754136/>
7. Madsen JM, Zimmermann NG, Timmons J, Tablante NL. Evaluation of Maryland backyard flocks and biosecurity practices. *Avian Dis.* 2013;57(2):233-7. Available from: <https://doi.org/10.1637/10428-101912-Reg.1>
8. Basler C, Nguyen TA, Anderson TC, Hancock T, Behravesh CB. Outbreaks of human salmonella infections associated with live poultry, United States, 1990–2014. *Emerg Infect Dis.* 2016;22(10):1705-11. Available from: <https://doi.org/10.3201/eid2210.150765>
9. Beam A, Garber L, Sakugawa J, Koprak C. Salmonella awareness and related management practices in U.S. urban backyard chicken flocks. *Prev Vet Med.* 2013;110(3-4):481-8. Available from: <https://doi.org/10.1016/j.prevetmed.2012.12.004>
10. Elkhoraibi C, Blatchford RA, Pitesky ME, Mench JA. Backyard chickens in the United States: A survey of flock owners. *Poult Sci.* 2014;93(11):2920-31. Available from: <https://doi.org/10.3382/ps.2014-04154>
11. Pohjola L, Rossow L, Huovilainen A, Soveri T, Hänninen M-L, Fredriksson-Ahomaa M. Questionnaire study and postmortem findings in backyard chicken flocks in Finland. *Acta Vet Scand.* 2015;57(1):3. Available from: <https://doi.org/10.1186/s13028-015-0095-1>
12. Karabozhilova I, Wieland B, Alonso S, Salonen L, Häsler B. Backyard chicken keeping in the Greater London Urban Area: welfare status, biosecurity and disease control issues. *Br Poult Sci.* 2012;53(4):421-30. Available from: <https://doi.org/10.1080/00071668.2012.707309>

13. Kauber K, Fowler H, Lipton B, Meschke JS, Rabinowitz P. Salmonella knowledge, attitudes and practices: a survey of backyard poultry owners residing in Seattle, Washington and the surrounding metropolitan area. *Zoonoses Public Health*. 2017;64(1):21-8. Available from: <https://doi.org/10.1111/zph.12274>
14. Sultana R, Rimi NA, Azad S, Islam MS, Khan MSU, Gurley ES, et al. Bangladeshi backyard poultry raisers' perceptions and practices related to zoonotic transmission of avian influenza. *J Infect Dev Ctries*. 2012;6(2):156-65. Available from: <https://doi.org/10.3855/jidc.2242>
15. Nicholson CW, Campagnolo ER, Boktor SW, Butler CL. Zoonotic disease awareness survey of backyard poultry and swine owners in southcentral Pennsylvania. *Zoonoses Public Health*. 2020;67(3):280-90. Available from: <https://doi.org/10.1111/zph.12686>
16. Behravesh CB, Brinson D, Hopkins BA, Gomez TM. Backyard poultry flocks and salmonellosis: a recurring, yet preventable public health challenge. *Clin Infect Dis Off*. 2014;58(10):1432-8. Available from: <https://doi.org/10.1093/cid/ciu067>
17. Manning J, Gole V, Chousalkar K. Screening for Salmonella in backyard chickens. *Prev Vet Med*. 2015;120(2):241-5. Available from: <https://doi.org/10.1016/j.prevetmed.2015.03.019>
18. Tobin MR, Goldshear JL, Price LB, Graham JP, Leibler JH. A framework to reduce infectious disease risk from urban poultry in the United States. *Public Health Rep*. 2015;130(4):380-91. Available from: <https://doi.org/10.1177/003335491513000417>
19. Centers for Disease Control and Prevention. Human salmonella infections linked to live poultry in backyard flocks [Internet]. Atlanta, GA: Centers for Disease Control and Prevention; 2017 [cited 2023 Jul 26]. Available from: <https://www.cdc.gov/salmonella/live-poultry-06-17/index.html>
20. Centers for Disease Control and Prevention. Salmonella outbreaks linked to backyard poultry [Internet]. Atlanta, GA: Centers for Disease Control and Prevention; 2022 [cited 2023 Apr 20]. Available from: <https://www.cdc.gov/salmonella/backyardpoultry-06-22/details.html>
21. Public Health Agency of Canada. Avian influenza A(H5N1): for health professionals [Internet]. Ottawa, ON: Government of Canada; 2023 [modified 2023 Jul 31; cited 2023 Apr 03]. Available from: <https://www.canada.ca/en/public-health/services/diseases/avian-influenza-h5n1/health-professionals.html>
22. Centers for Disease Control and Prevention. Technical report: highly pathogenic avian influenza A(H5N1) viruses [Internet]. Atlanta, GA: Centers for Disease Control and Prevention; 2023 [updated 2023 Mar 17; cited 2023 Apr 03]. Available from: <https://www.cdc.gov/flu/avianflu/spotlights/2022-2023/h5n1-technical-report.htm>
23. World Health Organization. Human infection with avian influenza A(H5) viruses [Internet]. Geneva: World Health Organization; 2023 [cited 2023 Apr 24]. Available from: https://www.who.int/docs/default-source/wpro---documents/emergency/surveillance/avian-influenza/ai_20230414.pdf?sfvrsn=5f006f99_113
24. Public Health Agency of Canada. Human emerging respiratory pathogens bulletin: issue 77, May 2023 [Internet]. Ottawa, ON: Government of Canada; 2023 [modified 2023 Aug; cited 2023 Jun 23]. Available from: <https://www.canada.ca/en/public-health/services/surveillance/human-emerging-respiratory-pathogens-bulletin/2023/may.html>

25. World Health Organization. Assessment of risk associated with recent influenza A(H5N1) clade 2.3.4.4b viruses [Internet]. Geneva: WHO; 2022 [cited 2023 Apr 3]. Available from: https://cdn.who.int/media/docs/default-source/influenza/avian-and-other-zoonotic-influenza/h5-risk-assessment-dec-2022.pdf?sfvrsn=a496333a_1&download=true
26. World Health Organization. Avian influenza A (H5N1) – the United States of America [Internet]. Geneva: World Health Organization; 2022 [cited 2023 Apr 04]. Available from: <https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON379>
27. World Health Organization. Influenza at the human-animal interface summary and assessment, 3 March 2023 [Internet]. Geneva: World Health Organization; 2023 [cited 2023 Mar 27]. Available from: <https://www.who.int/publications/m/item/influenza-at-the-human-animal-interface-summary-and-assessment-3-march-2023>
28. World Health Organization. Avian Influenza A (H5N1) - Cambodia. Geneva: World Health Organization; 2023 [cited 2023 Apr 03]. Available from: <https://www.who.int/emergencies/disease-outbreak-news/item/2023-DON445>
29. Samanta I, Joardar SN, Das PK. Chapter 14: biosecurity strategies for backyard poultry: a controlled way for safe food production. In: Holban AM, Grumezescu AM, editors. Food control and biosecurity: handbook of food bioengineering. London: Academic Press; 2018. p. 481-517. Available from: <https://doi.org/10.1016/B978-0-12-811445-2.00014-3>
30. Hoa LNM, Tuan NA, My PH, Huong TTK, Thi N, Chi NTY, et al. Assessing evidence for avian-to-human transmission of influenza A/H9N2 virus in rural farming communities in northern Vietnam. *J Gen Virol*. 2017;98(8):2011-6. Available from: <https://doi.org/10.1099/jgv.0.000877>
31. Yang J, Yan J, Zhang C, Li S, Yuan M, Zhang C, et al. Genetic, biological and epidemiological study on a cluster of H9N2 avian influenza virus infections among chickens, a pet cat, and humans at a backyard farm in Guangxi, China. *Emerg Microbes Infect*. 2023;12(1):2143282. Available from: <https://doi.org/10.1080/22221751.2022.2143282>
32. Zheng T, Adlam B, Rawdon TG, Cork SC, Hope V, et al. A cross-sectional survey of influenza A infection and management practices in small rural backyard poultry flocks in New Zealand. *N Z Vet J*. 2010;58(2):74-80. Available from: <https://doi.org/10.1080/00480169.2010.65086>
33. Yendell SJ, Rubino I, Lauer DC, Bender JB, Scheftel JM. Antibody prevalence of low-pathogenicity avian influenza and evaluation of management practices in Minnesota backyard poultry flocks. *Zoonoses Public Health*. 2012;59(2):139-43. Available from: <https://doi.org/10.1111/j.1863-2378.2011.01427.x>
34. Ontario. Ministry of Agriculture, Food and Rural Affairs. Animal health update: avian influenza for small flock owners and bird fanciers [Internet]. Toronto, ON: Queen’s Printer for Ontario; 2022 [cited 2023 Feb 28]. Available from: <https://www.ontario.ca/files/2023-01/omafra-animal-health-update-avian-influenza-small-en-2022-03-27.pdf>
35. Lebert L, Martz S-L, Janecko N, Deckert AE, Agunos A, Reid A, et al. Prevalence and antimicrobial resistance among *Escherichia coli* and *Salmonella* in Ontario smallholder chicken flocks. *Zoonoses Public Health*. 2018;65(1):134-41. Available from: <https://doi.org/10.1111/zph.12381>

36. Brochu NM, Guerin MT, Varga C, Lillie BN, Brash ML, Susta L. A two-year prospective study of small poultry flocks in Ontario, Canada, part 1: prevalence of viral and bacterial pathogens. *J Vet Diagn Invest.* 2019;31(3):327-35. Available from: <https://doi.org/10.1177/1040638719843577>
37. Crespo R, Garner MM, Hopkins SG, Shah DH. Outbreak of *Listeria monocytogenes* in an urban poultry flock. *BMC Vet Res.* 2013;9:204. Available from: <https://doi.org/10.1186/1746-6148-9-204>
38. Murillo AC, Mullens BA. Diversity and prevalence of ectoparasites on backyard chicken flocks in California. *J Med Entomol.* 2016;53(3):707-11. Available from: <https://doi.org/10.1093/jme/tjv243>
39. Li L, Luther M, Macklin K, Pugh D, Li J, Zhang J, et al. *Chlamydia gallinacea*: a widespread emerging *Chlamydia* agent with zoonotic potential in backyard poultry. *Epidemiol Infect.* 2017;145(13):2701-3. Available from: <https://doi.org/10.1017/S0950268817001650>
40. Provecho YM, Fernández M del P, Salvá L, Meli S, Cano F, Sartor P, et al. Urban infestation by *Triatoma infestans* (Hemiptera: Reduviidae), an overlooked phenomena for Chagas disease in Argentina. *Mem Inst Oswaldo Cruz.* 2021;116:e210056. Available from: <https://doi.org/10.1590/0074-02760210056>
41. Salinas L, Loayza F, Cárdenas P, Saravia C, Johnson TJ, Amato H, et al. Environmental spread of extended spectrum beta-lactamase (ESBL) producing *Escherichia coli* and ESBL genes among children and domestic animals in Ecuador. *Environ Health Perspect.* 201;129(2):027007. Available from: <https://doi.org/10.1289/EHP7729>
42. Keerthirathne TP, Ross K, Fallowfield H, Whiley H. Examination of Australian backyard poultry for *Salmonella*, *Campylobacter* and *Shigella* spp., and related risk factors. *Zoonoses Public Health.* 2022;69(1):13-22. Available from: <https://doi.org/10.1111/zph.12889>
43. World Health Organization. Influenza (Avian and other zoonotic) [Internet]. Geneva: World Health Organization; 2018 [cited 2023 Mar 27]. Available from: [https://www.who.int/news-room/fact-sheets/detail/influenza-\(avian-and-other-zoonotic\)](https://www.who.int/news-room/fact-sheets/detail/influenza-(avian-and-other-zoonotic))
44. Bertran K, Balzli C, Kwon Y-K, Tumpey TM, Clark A, Swayne DE. Airborne transmission of highly pathogenic influenza virus during processing of infected poultry. *Emerg Infect Dis.* 2017;23(11):1806-14. Available from: <https://doi.org/10.3201/eid2311.170672>
45. Martin W, Schuft A.. Avian influenza basics for urban and backyard poultry owners [Internet]. St Paul, MN: Regents of the University of Minnesota; 2022 [cited 2023 Feb 28]. Available from: <https://extension.umn.edu/poultry-health/avian-influenza-basics-noncommercial-poultry-flock-owners>
46. Powers L. Introduction to backyard poultry [Internet]. Cranbury, NJ: DVM 360; 2015 [cited 2023 Apr 11]. Available from: <https://www.dvm360.com/view/introduction-backyard-poultry-proceedings>
47. Canadian Food Inspection Agency. How to prevent and detect disease in small flocks and pet birds [Internet]. Ottawa, ON: Government of Canada; 2011 [modified 2022 Jan 24; cited 2023 Feb 28]. Available from: <https://inspection.canada.ca/animal-health/terrestrial-animals/diseases/backyard-flocks-and-pet-birds/eng/1323643634523/1323644740109>

48. Canadian Food Inspection Agency. Protect your flock from bird flu [Internet]. Ottawa, ON: Government of Canada; 2023 [modified 2023 May 05; cited 2023 Feb 28]. Available from: <https://inspection.canada.ca/animal-health/terrestrial-animals/diseases/reportable/avian-influenza/protect-your-flock/eng/1614352583029/1614352660146>
49. Indiana State Board of Animal Health. What hobby poultry owners should know about preventing avian influenza [Internet]. Indianapolis; IN: Office of the State Veterinarian; 2022 [cited 2023 Feb 28]. Available from: <https://www.in.gov/boah/files/BYB-Biosecurity-Advisory-2-16-22.pdf>
50. US Department of Agriculture. Prevent avian influenza at your farm, improve your biosecurity with simple wildlife management practices [Internet]. Sacramento, CA: California Department of Food and Agriculture; 2015 [cited 2023 Feb 28]. Available from: https://www.cdfa.ca.gov/ahfss/Animal_Health/pdfs/AI/HPAIFactsheet_WildlifeBiosecurity.pdf
51. Ontario. Ministry of Agriculture, Food and Rural Affairs. Raise healthy small flock poultry [Internet]. Ottawa, ON: King's Printer for Ontario; 2022 [updated 2023 Mar 20; cited 2023 Sept 18]. Available from: <http://www.ontario.ca/page/raise-healthy-small-flock-poultry>
52. Derksen T, Lampron R, Hauck R, Pitesky M, Gallardo RA. Biosecurity assessment and seroprevalence of respiratory diseases in backyard poultry flocks located close to and far from commercial premises. *Avian Dis.* 2017;62(1):1-5. Available from: <https://doi.org/10.1637/11672-050917-Reg.1>
53. US Department of Agriculture. Defend the flock - biosecurity 101 [Internet]. Washington, DC: US Department of Agriculture; 2021 [modified 2021 Apr 25; cited 2023 Feb 28]. Available from: <https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/avian/defend-the-flock-program/df-biosecurity/bird-biosecurity>
54. Queensland Government. Preventing diseases in backyard poultry [Internet]. Brisbane, QL: State of Queensland; 2023 [updated 2023 Jan 30; cited 2023 Feb 28]. Available from: <https://www.qld.gov.au/families/government/pets/backyard-poultry>
55. Correia-Gomes C, Henry MK, Reeves A, Sparks N. Management and biosecurity practices by small to medium egg producers in Scotland. *Br Poult Sci.* 2021;62(4):499-508. Available from: <https://doi.org/10.1080/00071668.2021.1894635>
56. Centers for Disease Control and Prevention. Multistate outbreak of human salmonella hadar infections linked to live poultry in backyard flocks [Internet]. Atlanta, GA: Centers for Disease Control and Prevention; 2012 [cited 2023 Apr 13]. Available from: <https://www.cdc.gov/salmonella/hadar-live-poultry-07-12/index.html>
57. Centers for Disease Control and Prevention. Multistate outbreak of human salmonella montevideo infections linked to live poultry in backyard flocks. Atlanta, GA: Centers for Disease Control and Prevention; 2012 [cited 2023 Apr 13]. Available from: <https://www.cdc.gov/salmonella/montevideo-06-12/index.html>
58. Centers for Disease Control and Prevention. Multistate outbreak of human salmonella infections linked to live poultry in backyard flocks. Atlanta, GA: Centers for Disease Control and Prevention; 2012 [cited 2023 Apr 13]. Available from: <https://www.cdc.gov/salmonella/live-poultry-05-12/index.html>

59. Canadian Food Inspection Agency. Protecting your flock from influenza – have you got it right? [Internet]. Ottawa, ON: Government of Canada; 2016 [modified 2022 Jan 20; cited 2023 Feb 28]. Available from: <https://inspection.canada.ca/animal-health/terrestrial-animals/biosecurity/standards-and-principles/avian-biosecurity/protecting-your-flock-from-influenza/eng/1461799560842/1461801401264>
60. Ontario. Ministry of Health and Long-Term Care. Highly pathogenic H5N1 avian influenza: frequently asked questions [Internet]. Toronto, ON: Queen’s Printer for Ontario; 2022 [cited 2023 Mar 22]. Available from: <https://www.health.gov.on.ca/en/pro/programs/emb/avian/faq.aspx#12>
61. Ontario. Ministry of Agriculture, Food and Rural Affairs. Poultry biosecurity preparedness initiative guidelines [Internet]. Toronto, ON: King’s Printer for Ontario; 2023 [modified 2023 Sept 18; cited 2023 Apr 11]. Available from: <https://omafra.gov.on.ca/english/livestock/urbanagricul.html>
62. Chicken Farmers of Ontario. Bird health and disease management [Internet]. Burlington, ON: Chicken Farmers of Ontario; 2022 [cited 2023 Apr 21]. Available from: <https://www.familyfoodgrower.ca/Bird-Health-and-Disease-Management>
63. Burns TE, Ribble C, McLaws M, Kelton D, Stephen C. Perspectives of an underrepresented stakeholder group, backyard flock owners, on poultry health and avian influenza control. *J Risk Res.* 2013;16(2):245-60. Available from: <https://doi.org/10.1080/13669877.2012.726244>
64. Alam MU, Rahman M, Abdullah-Al-Masud, Islam MA, Asaduzzaman M, Sarker S, et al. Human exposure to antimicrobial resistance from poultry production: Assessing hygiene and waste-disposal practices in Bangladesh. *Int J Hyg Environ Health.* 2019;222(8):1068-76. Available from: <https://doi.org/10.1016/j.ijheh.2019.07.007>
65. Environment and Climate Change Canada. Avian influenza in wild birds [Internet]. Ottawa, ON: Government of Canada; 2015 [modified 2023 Jun 02; cited 2023 Sept 18]. Available from: <https://www.canada.ca/en/environment-climate-change/services/migratory-game-bird-hunting/avian-influenza-wild-birds.html>
66. Sutherland M, Baron H, Llinas J. Recommended health care and disease-prevention programs for herds/flocks of exotic animals. *Veterinary Clin North Am Exot Anim Pract.* 2021;24(3):697-737. Available from: <https://doi.org/10.1016/j.cvex.2021.05.003>

Acknowledgements

Christine Navarro, Public Health Physician, Health Protection, PHO

Csaba Varga, DVM, MSc, DACVPM, Lead Veterinarian, Disease Prevention – Poultry, Ontario Ministry of Agriculture, Food and Rural Affairs

Dean Middleton, DVM, Epidemiologist Specialist, Chronic Disease and Injury Prevention, PHO

Richard Mather, Public Health Physician, Health Protection, PHO

Citation

Ontario Agency for Health Protection and Promotion (Public Health Ontario). Reducing health risks associated with backyard chickens. 2nd ed. Toronto, ON: King's Printer for Ontario; 2023.

Disclaimer

This document was developed by Public Health Ontario (PHO). PHO provides scientific and technical advice to Ontario's government, public health organizations and health care providers. PHO's work is guided by the current best available evidence at the time of publication. The application and use of this document is the responsibility of the user. PHO assumes no liability resulting from any such application or use. This document may be reproduced without permission for non-commercial purposes only and provided that appropriate credit is given to PHO. No changes and/or modifications may be made to this document without express written permission from PHO.

Publication History

Published: 2017

2nd Edition: September 2023

Public Health Ontario

Public Health Ontario is an agency of the Government of Ontario dedicated to protecting and promoting the health of all Ontarians and reducing inequities in health. Public Health Ontario links public health practitioners, front-line health workers and researchers to the best scientific intelligence and knowledge from around the world.

For more information about PHO, visit publichealthontario.ca.