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Starling Management in Agriculture

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European starlings (*Sturnus vulgaris*) were brought to the United States from Europe. They were released in New York City in 1890 and 1891 and, since that time, have spread across the country. They were observed in the midwest by 1930, in Colorado in 1939, and in California in 1942. The starling population in the United States has since grown to an estimated 140 million birds.

Starlings are frequently considered pests because of the damage they cause, especially to agriculture and in urban roosts. This publication provides facts about starlings and methods to control their damage in agriculture.

Starling Facts

Identification - Starlings are black, light-speckled, robin-size birds with a chunky, meadowlark shape (Figure 1). The bill of both sexes is yellow during the reproductive cycle (January to June) and dark at other times. Juveniles are pale brown to grey. The tail is short, and the wings have a triangular shape when outstretched in flight. Starling flight is direct and swift, not rising and falling like many blackbirds.



Figure 1. Adult European starling (*Sturnus vulgaris*).

Foods - Starlings eat various foods, including fruits and seeds of both wild and cultivated varieties. Insects, especially white grubs in lawns or pastures, and other invertebrates total about half the diet overall, and are especially important during the spring breeding season. Starlings also eat livestock rations and food found in garbage during the winter.

Movements - Although not always migratory, some will migrate up to several hundred miles. Others may remain in the same general area throughout the year. Outside the breeding season, starlings feed and roost in flocks. Each day, they may fly 15 to 30 or more miles from roosting to feeding sites. During winter, they roost in dense vegetation, such as coniferous trees, or in urban structures, farm buildings, and other areas protected from wind and weather. Some of these roosting areas are occupied by wintering starlings year after year.

Legal Status - Starlings are not protected by federal laws or, in most cases, by state laws.

Economic Impact

At livestock facilities, starlings consume feed and contaminate the feed and water with their droppings. Where high protein supplements are added to feeds such as cattle feeds, starlings may selectively eat the high-protein portion.

Starlings may also transfer disease among livestock facilities, a problem that particularly concerns swine producers. For example, TGE (transmissible gastroenteritis) virus can pass through the digestive tract of starlings and be infectious in the starling feces. However, researchers have found healthy swine in lots with infected starlings. Thus, even infected starlings may not always transmit the disease, especially if starling interaction with pigs is minimized. TGE may also be transmitted on boots or vehicles, by stray animals, or by infected swine added to the herd.

Starlings cause other agricultural damage by eating cultivated fruits such as grapes and cherries. In some areas they pull sprouting wheat and other grains and eat the planted seed. Starling roosts in rural and urban sites cause health, filth, noise, and odor problems. Their droppings damage and deface equipment and vehicles. In addition, starlings compete for nest sites with native hole-nesting birds such as blue-birds, flickers, woodpeckers, and purple martins.

On the beneficial side, starlings eat insects and other invertebrate pests such as lawn or pasture grubs. However, this benefit is partially offset by the fact that starlings often take over nest cavities of native insect-eating birds.

As trends move toward urban and rural sustainable landscapes, starlings and other birds may become more important in biological and integrated pest control systems.

Controlling Damage¹

Exclusion

Structures. Where starlings are a problem inside buildings or other structures, close all openings larger than one inch so they cannot enter (Figure 2). This is a permanent solution to problems inside the structure. Heavy plastic (PVC, polyvinyl chloride) or rubber strips hung in open doorways of farm buildings have been successful in keeping birds out, while allowing people, machinery, or livestock to enter (Figure 2). One installation approach is to hang 10-inch wide strips with about 2-inch gaps between them. Such strips might also protect feed bunkers. Where birds are roosting on a ledge, place a board or metal covering over the ledge at a 45° angle (Figure 3). Porcupine wires (metal protectors) are also available for preventing roosting on ledges or roof beams, and netting placed under roof beams will prevent roosting on the beams (Figure 4). Netting is also useful around buildings for covering window or other openings.



At livestock facilities such as this pig operation, European starlings consume feed, contaminate feed and water with their droppings, and may transmit disease.

Fruit Crops. Netting is useful for covering fruit crops such as cherries or grapes to prevent bird damage, and studies show it to be a cost-effective method of protecting higher-value grapes in commercial vineyards. For wine grapes harvested one time per season, tractor-mounted rollers can facilitate installation and removal of netting draped directly over vines. Some New York vineyards have used this method for 5 years with the original netting still in good condition. For table grapes harvested by hand several times per year, a frame can be used to hold the netting above the vines so it doesn't interfere with the frequent harvests. **A practical tip:** if protecting

the total vineyard is impractical, protect varieties that receive the most damage: those that ripen early or are otherwise highly attractive to birds (e.g. small, dark, sweet grapes).

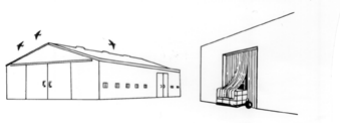


Figure 2. Bird-proof buildings to permanently eliminate bird problems inside.



Figure 3. A board or metal covering over a ledge at a 45° angle (a) or porcupine wires (b) can be used to prevent roosting and nesting.

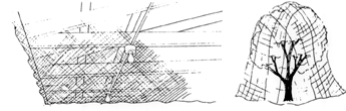


Figure 4. Netting can be used for excluding birds from building rafters and from fruit trees.

Cultural Methods and Habitat Modification

Starlings are attracted to livestock operations by the food or water available to them, especially during winter when the weather is cold and food scarce. Some livestock operations are more attractive to starlings than others. Operations with large quantities of feed always available, especially when located near a starling roost, are the most likely to have damage problems. Farm management practices are important in long-term starling control. These practices limit food and water available to starlings, thus making the livestock environment less attractive. The following practices used singly, or *preferably in combination*, will reduce feed losses and the chances of disease transmission as well as the cost and labor of conventional control measures:



Bird-proof livestock feeders such as these flip-top pig feeders limit starling access to the feed and reduce starling interaction with livestock.

1. Clean up spilled grain.
2. When storing grain, use bird-proof facilities (Figure 5).
3. Use bird-proof livestock feeders. These include flip-top pig feeders, lick wheels for liquid cattle supplement, and automatic-release feeders (magnetic or electronic) for costly high-protein rations. Avoid feeding on the ground because this is an open invitation to starlings.
4. Where possible, feed livestock in covered areas such as open sheds because these areas are less attractive to starlings.
5. Use feed forms that starlings cannot swallow such as cubes or blocks greater than 1/2 inch in diameter. Minimize use of 3/16-inch pellets
 - starlings eat these six times faster than granular meal.
6. When feeding protein supplements with other rations, such as silage, mix them well to limit starling access to the supplements.
7. Where possible, adjust feeding schedules so that feed exposure to birds is minimized. For example, when feeding once per day, such as in a limited energy feeding program for gestating sows, delay the feeding until late in the afternoon when foraging by starlings is decreased. Feeding cattle at night, where appropriate, is another possibility. Starlings prefer to feed early to midday and in areas where feed is constantly available. Feeding schedules that take these factors into account reduce problems.
8. Starlings are especially attracted to water. Drain or fill in unnecessary water pools around livestock operations. Where feasible, livestock waterers can be made unavailable or less attractive to starlings by controlling the water level. Lower the water level so that starlings cannot reach it when perching on the edge of the waterer. At the same time, keep the water level deep enough so they cannot stand in it (Figure 6).

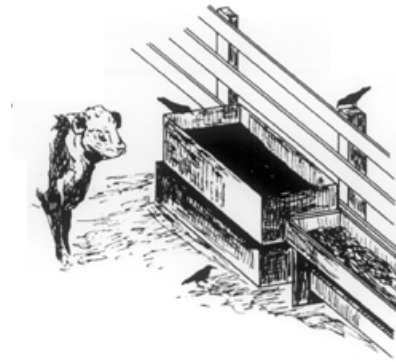


Figure 6. Lower the water level in livestock waterers so starlings cannot reach it when perching on the edge. At the same time, keep the water level high enough that they cannot stand in it.



Propane exploders frighten starlings from many damage situations by producing a loud report at pre-determined intervals. For best results, exploders should be elevated above vegetation and the location and report interval changed regularly. Although these have been used successfully at some cattle feedlots, the loud noise may frighten some livestock.

9. Modify starling roost sites by closing openings in buildings or other structures so starlings cannot enter.

Frightening

Frightening is effective in dispersing starlings from roosts, small-scale fruit crops, and some other troublesome situations. It is useful around livestock operations that have warm climates year-round, and where major concentrations of wintering starlings exist. In the mid to northern states, starlings concentrate at livestock facilities primarily during cold winter months when snow covers natural food sources. At this time, baiting and other techniques are generally more effective than frightening. In addition, frightening starlings may disperse birds to other livestock facilities, a negative point that should be considered if disease transfer is a concern.

Frightening devices include recorded distress or alarm calls, gas-operated exploders, battery-operated alarms, pyrotechnics (e.g. shellcrackers, bird bombs), chemical frightening agents (see Avitrol below), lights (for roosting sites at night), bright objects, and other noise makers. Beating on tin sheets or barrels with clubs also scares birds. Some novel visual frightening devices with potential effectiveness are eye-spot balloons, hawk kites, and mylar reflective tape. Ultrasonic (high frequency, above 20 kHz) sounds do not frighten starlings and most other birds because, like humans, they do not hear these sounds.

Harassing birds, throughout the evening as they land, can be effective in dispersing bird roosts if done for three to four consecutive evenings or until birds no longer return. Spraying birds with water from a hose or from sprinklers mounted in the roost trees has helped in some situations. *A combination of several scare techniques used together works better than a single technique used alone.* Varying the location, intensity, and types of scare devices improves their effectiveness.

Two additional tips for successful frightening efforts: 1) begin early before birds form a strong attachment to the site and 2) be persistent until the problem is solved.

Avitrol. Avitrol (active ingredient: 4-aminopyridine) is a Restricted Use Pesticide available in several bait formulations as a chemical frightening agent. Avitrol baits contain a small number of treated grains or pellets mixed with many untreated grains or pellets. Birds that eat the treated portion of the bait behave erratically and/or give warning cries that frighten other birds from the area. Generally, birds that eat the treated particles will die. At the dilution rates registered for use at feedlots, there is potential hazard to non-target hawks and owls that might eat birds killed by Avitrol. So, it's important to pick up and bury or incinerate any dead starlings found.

Around livestock operations, Avitrol is sometimes used where the goal is to frighten or disperse the birds rather than to kill them. However, many birds may be killed, and data are lacking on whether the results of Avitrol use at feedlots take place because of frightening aspects or from direct mortality. If any Avitrol baits are to be used, contact a qualified person trained in bird control work for technical assistance (e.g. contact USDA/APHIS/ Animal Damage Control or Cooperative Extension).

The Avitrol Pelletized Feed formulation is generally recommended for starling control because starlings usually prefer pellets over cracked corn (corn chops). The Double Strength Corn Chops formulation is probably best for mixed flocks of starlings and blackbirds. Because Avitrol is designed as a frightening agent, birds can develop bait shyness (bait rejection) fairly quickly. Prebaiting for several days with untreated pellets may be necessary for effective bait consumption and control. If the problem persists, changing bait locations and additional prebaiting may be needed.

Repellents

Soft, sticky repellents are non-toxic materials used to discourage starlings from roosting on ledges or roof beams. Examples include Roost-No-More, Bird Tanglefoot, 4-The-Birds, and others. It often helps to first put masking tape on the surface needing protection, then apply the repellent onto the tape. This increases effectiveness on porous surfaces and makes removal, if desired, easier. Over time, these materials lose their effectiveness and must be replaced.

Trapping

The wide-ranging movements of starlings, the time necessary to maintain and manage traps, and the number of starlings that can be captured compared to the total number in an area, often make trapping an impractical control method. However, trapping and removing starlings can be successful at locations where a static population is causing damage or where other techniques can't be used. An example is using decoy traps to remove starlings from an orchard where they are damaging fruit crops.

Decoy traps for starlings should be at least 5 to 6 feet high to allow servicing and can be quite large (e.g. 10 feet wide by 30 feet long). A convenient size is 6 by 8 by 6 feet (Figure 7). If desired, the sides and top can be constructed in panels to facilitate transportation and storage. In addition, decoy traps can be set up on a farm wagon and moved to the best places to catch starlings. To be successful, the trap should be placed where starlings are likely to congregate. Leave a few starlings in the trap as

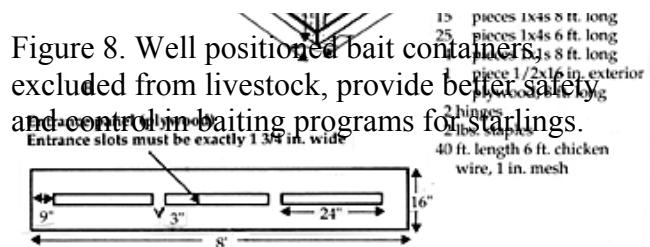


Figure 7. Starling decoy trap: (A) assembled view and (B) details of the entrance panel. Side and end panels are covered with wire on the outside, top panels are covered on the inside of the frame.

decoys; their feeding behavior and calls attract other starlings that are nearby. Decoy birds in the trap must be well watered (which may include a bird bath) and fed. A well-maintained decoy trap can capture 100 or more starlings per day depending on size and location, time of year, and how well the trap is maintained. Should any non-target birds be captured, release them immediately. To kill captured starlings humanely, use appropriate procedures such as carbon dioxide exposure or cervical dislocation (quickly breaking the neck).

Shooting

Shooting is more effective as a dispersal technique than as a way to reduce starling numbers. The number of starlings that can be killed by shooting is small in relation to the numbers of starlings usually involved in pest situations. However, when shooting is used as part of a dispersal program, it can supplement and reinforce others.

Toxicants - Starlicide Complete

Starlicide Complete (0.1% 3-chloro p-toluidine hydrochloride) is registered for controlling starlings and blackbirds around livestock and poultry operations. It is toxic to other types of birds in differing amounts, but will not kill house (English) sparrows at registered levels. Mammals are generally resistant to the toxic effects.

Poisoned birds experience a slow, non-violent death. They usually die 24 to 36 hours after feeding, often at their roost. Generally, few dead starlings will be found at the baiting site. Poisoned starlings are not dangerous to scavengers or predators. For good sanitation and to prevent the spread of diseases which the birds may carry, pick up and bury or incinerate dead starlings.

Fresh bait is best. The current formulation of Starlicide Complete loses effectiveness in storage. Bait kept on hand from one winter to the next may lose some of its potency and bait kept for two years may not work at all.

How to Use - Field tests in both the western and eastern U.S. have established guidelines for using Starlicide Complete. For the best success in a control program:

1. *Observe* birds feeding in and around the livestock operation. Note the number of starlings and when and where they prefer to feed. The best time for observing is usually during the first few hours following sunrise when birds will be seeking their morning meal.
2. *Determine* what kinds of birds are feeding. If any protected birds such as doves, quail, pheasants, or songbirds are present, contact your local Cooperative Extension office, USDA/APHIS/Animal Damage Control office, or the state wildlife agency for advice. *Do not apply toxic bait if protected bird species are present.*
3. *Time of Application* - Use of bait is more effective on cold days when snow covers the ground. At this time, starlings become stressed for food and concentrate in livestock feeding areas.

4. *Prebaiting* is usually desirable. Use a prebait (non-poisonous bait) to accustom starlings to feeding on bait at particular locations. Place the prebait in areas where the starlings concentrate to feed, but where it won't be accessible to livestock or other non-target animals (e.g. in containers on top of large barrels, wagons, or flat roofs). The best prebait is a high quality, pelleted feed that resembles the toxic bait in color, size, and texture. If such prebait is unavailable, use a good quality feed such as that normally fed to livestock.

Prebait for 1 to 4 days until the birds readily feed on the prebait. If good consumption is not seen, move the prebait to another location where starlings are concentrating to feed.

5. *Bait Placement* - Bait containers permit collection of uneaten bait and protect bait from the weather (Figure 8). Black rubber calf feeder pans work well for this. They do not tip easily, are dark colored and do not frighten the birds, and the bait is openly exposed. Empty farm wagons, feeder lids turned upside down, wooden troughs, or other containers may also work. Avoid brightly colored or shiny containers or those that might tip and spill bait. At night, the containers can be covered to protect the bait from the weather. However, they must be uncovered at dawn so starlings can feed as soon as they arrive. At large feedlots where large numbers of starlings (more than 100,000) are involved, and where large quantities of feed are available on the ground, broad-cast baiting as per label directions is recommended.
6. *Toxic Bait* - After the starlings feed readily on the prebait, remove all prebait and replace it with Starlicide Complete. Consult the label directions for the amount to use (one pound of bait will kill about 100 to 200 starlings when used properly). The total number of starlings using a farm over time may greatly exceed the numbers observed on a given day, so continue baiting for at least 2 or 3 days or until bait consumption diminishes. Bait should be available to the starlings at all times when they are present.
7. *Remove Bait* - After bait consumption diminishes, remove any remaining bait. Observe any birds arriving at the feedlot for the next 2 to 3 mornings after baiting. Reduced bird numbers at this time indicate bird control, as most birds will die at the roost. If starlings continue to be present, or if they gradually return in increasing numbers, wait until a number of birds are regularly returning to feed at the area. Then apply prebait and toxic bait (Steps 4 to 6) as before. Do not leave Starlicide Complete exposed for prolonged periods because this may cause bait rejection, and may also increase hazards to protected bird species.
8. *Group Baiting* - For most effective control, consider coordinating control efforts with your neighbors. Because starlings may forage over a large geographical area and may change feeding sites from day to day, several persons baiting at the same time will produce better control. Notify local wildlife officials of your plans so that if large numbers of starlings are removed, they will be able to explain the die-off.
9. *Cautions* - Starlicide Complete is poisonous to chickens, turkeys, ducks, and some other birds. Never expose bait where poultry, livestock, or non-target wildlife can feed on it. Do not re-package Starlicide Complete into anything other than its original container. Read and follow all label directions.

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For more information, technical assistance, and or sources of damage control supplies, contact your: USDA/APHIS/Animal Damage Control office or Cooperative Extension office.

¹ *Use of trade names does not imply endorsement.*

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