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USE OF STARLICIDE TO REDUCE STARLING DAMAGE AT LIVESTOCK FEEDING OPERATIONS

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ABSTRACT: Starling damage at livestock feedlots is discussed and background information is given on the properties of Starlicide® which need to be considered when using this product for control of starlings. A five-step guideline for a starling control program with Starlicide is presented: pretreatment assessment, collecting information and materials, prebaiting, baiting strategies with bait containers and broadcast application methods, and posttreatment assessment.

INTRODUCTION

One of the most serious agricultural problems caused from the introduction of starlings (*Sturnus vulgaris*) into the United States is their consumption of feed rations at livestock feeding operations. No accurate estimates of damage are available, but damage appears to be widespread throughout the wintering range of the starling. Data suggest the problem is usually associated with the proximity of livestock feedlots to large winter roosting concentrations of birds. During winter months, their natural food of soft fruit and insects are depleted, and large flocks of up to 500,000 birds have been reported to concentrate at livestock operations and consume large quantities of feed (Fowler 1967). Actual losses are difficult to calculate, but estimates suggest that a single starling could consume about two pounds of pelleted feed per month (Besser et al. 1968). Based on these cost estimates, Palmer (1976) extrapolated the seasonal economic loss from starling damage at one California feedlot at \$4,200.

Since its registration in 1967, Starlicide® (1% 3-chloro-p-toluidine hydrochloride on poultry pellets) has been the single most effective means of reducing starling losses in livestock feeding operations. (Use of trade names does not imply government endorsement of commercial products). Treated pellets are diluted with untreated pellets at a 1:9 ratio in the commercially available product called Starlicide Complete (distributed by the Ralston-Purina Company, St. Louis). Although it is not the panacea to all starling-related feedlot damage situations, the properties of this product, for the most part, make it a particularly safe and effective starling toxicant. It is highly toxic to starlings and blackbirds (a single treated pellet contains a lethal dose) and much less toxic to most other birds, mammals, and avian predators. In the starling, Starlicide is a slow acting toxicant; death occurs 24 - 72 hours after ingestion. Even at extremely high dosage levels, death does not occur in less than three hours, thereby reducing the chance of bait shyness developing from the presence of dead birds at the bait site (DeCino et al. 1966). Almost all the toxicant is metabolized before death, thereby reducing secondary hazards to scavengers (Schafer, pers. comm.). The poultry pellet carrier has been shown to be highly preferred by starlings in most situations and less preferred by other birds (West et al. 1967).

Other properties of the product are somewhat less desirable. First, the pelleted bait rapidly disintegrates with exposure to moisture, reducing palatability and effectiveness to starlings. Recent evidence indicates that the

effective shelf life of the product in storage is only about six months, thus efficacy may be reduced when Starlicide is stored for considerable periods of time. Other recent evidence suggests that a phenomenon resembling bait aversion may occur with this product (Stickley, In Press). Although this aversion mechanism is not completely understood, it must be considered as a factor in how the product is used. Several studies of Starlicide use at feedlots have reported reductions in starling numbers from 75 to 97% (Besser et al. 1967, Royall et al. 1967, Stickley, In Press). However, the results obtained can be largely influenced by the particular situation and how the product is used. Proper use of Starlicide (as well as any pest control material) is the key factor to success and most of the unsatisfactory results can be traced to improper use. For this reason, I have outlined some practical guidelines for application of this product in a starling control program. These guidelines are not absolute, but reflect information derived from several years of field trials with the product by personnel of the Denver Wildlife Research Center as well as other pertinent information available at this time.

Basically, there are five principal steps to effective starling control with this product. These steps will take some time and effort to perform, but they are crucial to the success of any control program using Starlicide.

USE OF STARLICIDE

Pretreatment Assessment

A fundamental, but often neglected, first step is assessing the problem. Assuming there are birds present at the lot, it is important to identify the species of these birds and grossly estimate their numbers. The most common problem species is starlings, but starlings can be mixed with large numbers of blackbirds or the flock may be exclusively blackbirds. Another possibility may be an unusually large population of house sparrows (Passer domesticus). Pelleted Starlicide baits are somewhat less effective on blackbirds and completely ineffective on sparrows. If starlings are the problem species, it is important to get an estimate of their numbers not only to figure the cost-benefits of buying a \$40 bag of Starlicide, but also to estimate how much material should be purchased and how it should be applied. This can be best done in the morning by estimating the numbers of birds as they arrive at the feedlot on flightlines from the roost site. At the same time, it is equally important to observe the feeding habits of the birds to determine the types of rations being consumed and whether most of the feeding activity takes place on the ground or in feed bunkers. Based on these observations, the cost of starling damage from feed loss can be estimated from data (modified from Besser et al. 1968) on the daily consumption capability of the starling at 0.0625 pound per bird per day in the following equation:

$$\text{Cost of feed ration consumed/day} = \text{estimated starlings (to nearest thousand)} \times \text{fraction of birds using troughs} \times \text{cost of feed ration per pound} \times 0.0625 \text{ pound consumed/starling.}$$

The cost per damage season can be extrapolated by simply multiplying this figure by an expected 90 days of feed use by starlings.

Also, during this damage assessment step, it is important to consider what, if any, alternative control methods could be used to reduce the problem. These include bird proofing grain storage facilities, eliminating spilled

grain areas, and reducing the exposure of grain laden animal waste which might be creating or increasing the problem. Also worth considering is the variety of frightening devices available, such as propane-operated exploders, shell crackers, rope firecrackers, recorded distress calls, and the AV-Alarm System, any of which may be effective in repelling birds from feedlots, at least temporarily.

Information and Materials Needed

The second step in starling control is collecting pertinent information and materials. If Starlicide baiting appears appropriate for controlling the assessed problem, it is important to first check whether the material is registered in the state (at present it is registered in 30 states), whether a permit (usually obtained through state wildlife authorities) is required for its use, and whether a source is available. Information may also be available from the Extension Service regarding other Starlicide formulations that are registered in the state in addition to the pelleted product distributed by Purina. These may include formulations or cull french fries in potato growing areas and on various grains. Considering the stability of Starlicide, it is important to get the freshest material available and not buy more than immediately needed. One 50 pound bag of prediluted product should be used for every 10,000 starlings using the lot. After purchasing the material, it is important to read the entire label and follow all label precautions regarding handling and storage. At the same time, one will need to purchase untreated pellets (prebait) that are similar in size and shape to the Layena^R poultry pellets used in the Starlicide formulation. The amount of prebait needed will probably be several times the amount of Starlicide used.

Prebaiting

The third step in the control operation is prebaiting. At this point, good observations in the damage assessment step will pay off. The first decision to be made is where and how to place prebaits since this will determine how the Starlicide will be used. Prebait should be placed as close as possible to the feeding sites of the starlings, but not accessible to livestock. The prebait pellets should be mixed with the livestock rations being consumed by starlings. Later, this can be switched to all pelleted prebait if starlings seem to prefer it.

Two options exist in applying prebait and bait: The first is broadcasting the bait thinly on the ground and the second is to place it in bait containers. The choice will depend largely on the damage situation. Bait containers have several advantages when dealing primarily with trough feeding starlings in numbers of 100,000 birds or less. These advantages include being able to retrieve bait with impending inclement weather, reducing hazards to nontarget birds and poultry, and giving the operator better control over the exposure time of treated baits. Almost anything that will hold bait, including unused feed troughs and feeders, can be used for bait containers. If these are not available, simple "V" shaped troughs can be fabricated out of scrap lumber and placed on the outside of or near the feed trough. Good success has been reported with heavy-duty rubber tubs on the roof of feed troughs and feeders. Another option is baiting on the bed of a farm wagon that can be drawn into shelter in case of inclement weather. The number of bait containers used will depend on the number of birds and amount of bait you want to expose at one time.

Broadcast baiting at a rate of 20 - 50 pounds per acre, as per label directions, is best used when large numbers (>100,000) birds are feeding from a large area on the ground. The advantages of this method are increasing the chances of reducing blackbird numbers often associated with starlings, because blackbirds appear more reluctant to feed from bait containers, and increasing the baiting area to affect larger numbers of starlings in a shorter time. However, these advantages must be weighed carefully against the large amount of prebait and bait required and the need of an extended period of dry or frozen ground on which to broadcast bait. Whichever method is used, prebaiting should be maintained at the bait site for 3 - 5 days and its consumption monitored. If prebait pellets are not readily accepted by birds, the location of bait or manner of baiting should be changed.

Baiting

After obtaining good prebait acceptance, the fourth step is baiting with the Starlicide product. To increase bird use when the Starlicide bait is applied in containers, the time of application should be with the occurrence of snow cover or frozen ground which reduces alternate food supplies. When broadcast baiting, the bait should be applied on frozen ground or ground cleared of snow. If possible, bait should be applied in the morning just before bird arrival at the bait site. This is important since both starling feeding activity and toxicity of Starlicide baits appear to be greatest during the morning hours when their stomachs are empty. If bait containers are used, the Starlicide Complete should be diluted 1:1 with untreated prebait pellets. This will reduce the cost as well as increase the kill per pound of Starlicide because a bird usually will obtain only one treated pellet when feeding rapidly from bait containers. If bait is broadcasted, the product should be applied as it comes from the bag.

Effective Starlicide use is a balance between two conflicting strategies. The first strategy is maintaining sustained bird use of bait over a period of days since only a portion of the population using the feedlot may be present on a single day and not all will pick up a treated pellet. However, those birds not picking up a treated pellet on the first day may decoy more birds onto the bait site on successive days. Thus, several days of bait exposure are necessary for resolving most problems. The second strategy is to reduce the occurrence of bait aversion, which can develop from prolonged exposure to treated baits. Bait consumption and bird numbers must be used together to determine when bait aversion is developing and should be monitored carefully. Evidence of bait aversion is the reduction of bait consumption without a corresponding reduction in bird numbers. Changes in the relative bird activity at bait sites or stations versus activity at feed troughs can provide another clue. Bait consumption should drop off dramatically after the first two or three days of exposure and, if possible, bait should be removed at this time.

Posttreatment Assessment

The last step in starling control is the posttreatment assessment. Two or 3 days following bait exposure, bird activity and damage should be reassessed. The assessment should not be based on birds found dead at the lot since most birds will die far removed from this site. A gross estimate of the number of birds killed from the control program can be made by figuring that 200 - 400 birds are killed per pound of undiluted Starlicide consumed. If bird activity or damage is still unacceptable, the prebaiting and baiting steps should be

repeated. These prebaiting and baiting cycles should be continued as long as necessary to reduce the problem. With persistent problems, it may be necessary to prebait constantly in sheltered bait stations and adding Starlicide to these stations when prebait consumption and bird populations increase. If aversion to the bait sites develops, locations and bait types should be changed. In certain situations, Starlicide alone may not be sufficiently effective. In these situations, the Division of Wildlife Assistance, U. S. Fish and Wildlife Service, should be contacted for additional help in controlling damage. One option in this situation would be the use of a chemical-frightening agent (Avitrol) to drive remaining birds out of the lot.

CONCLUSION

The use of Starlicide as outlined is the best approach available at the present time to reduce starling damage at livestock feedlots. However, researchers at the Denver Wildlife Research Center are studying ways to improve Starlicide and its use and are developing alternative methods of alleviating this problem.

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