NPB FINAL RESEARCH GRANT REPORT

Evaluation of Scavenger Mitigations for Animal Mortality Management, NPB PO-001442
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Industry Summary: Animal mortality management continues to pose a significant challenge during the response to animal disease outbreaks. Scavenger activity around mortality management sites is a growing concern, especially in biosecurity. To address this challenge, a research study was designed to identify mitigations that are currently being used in scavenger damage management programs and evaluate their effectiveness under a variety of field conditions related to mortality management. The purpose of this project was to establish research that evaluates the effectiveness of deterrent methods that discourage scavenger wildlife from disturbing livestock mortality composting and burial sites.

Our objectives were to determine the relative effectiveness of several deterrent methods in dispersing scavengers away from compost piles and to determine how the effectiveness of each deterrent method changes through time. The proposed deterrent methods were classified as “low effort” or “high effort” options and serve as a psychological or physical barrier to scavenger access to the sites. This study evaluated the effectiveness of a motion-activated inflatable deterrent (Scare Dancer), a real vulture effigy, a fake vulture effigy, and electric fencing as deterrents to avian and terrestrial scavengers. These deterrent techniques have been shown to be effective in various wildlife conflict situations. However, they had never been tested in these unique mortality management circumstances. We determined the relative effectiveness of each deterrent method by deploying game cameras within the perimeter of each compost site. By placing game cameras within the perimeter, we detected only wildlife that are using the compost site. Each deterrent was employed for a fixed period of 30 days before it was removed and another deterrent was placed. Our response variable was the counts of individuals per camera trapping day.

Proper disposal/composting techniques are the first step in minimizing scavenger interactions when dealing with regular mortality or catastrophic mortality events. Properly covering mortality will reduce attractions that lead to negative interactions with scavengers. Information and education programmers need to work with local producers to ensure that they receive the appropriate information and technical guidance on carcass disposal and management. Not all scavenger interactions will be eliminated by proper disposal; as such, we need to provide information not only on proper disposal, but also on the appropriate scavenger mitigation techniques and availability of resources to increase effectiveness of proper composting. With that in mind, both real and fake vulture effigies were effective at deterring Turkey Vultures and Black Vultures, but not other avian visitors (Red-tailed Hawk, Red-shouldered Hawk, and other passerine species). A motion-activated inflatable deterrent did reduce visitation by avian scavengers, but not as well as effigies. A portable electric fence was effective at reducing terrestrial scavenger visitations to mortality sites.

Our findings are a valuable first step in better understanding the effectiveness of various scavenger deterrents in managing mortality. All of these deterrents are relatively inexpensive and can be stored (except real vulture effigies) within extension offices, emergency management programs, local co-ops, or individual farms, to be used in regular mortality management or during a disease emergency.

These research results were submitted in fulfillment of checkoff-funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer-reviewed.

Key Findings:

- Proper disposal/composting techniques (fully covering mortality) are key in minimizing scavenger interactions when dealing with regular mortality or catastrophic mortality events.
- Both fake and real vulture effigies provide an effective deterrent to both Black and Turkey Vulture visitations to compost piles.
- The addition of portable-electric fencing is effective in reducing visitations by mammalian scavengers.

Keywords: Black Vulture, Turkey Vulture, effigy, deterrent, mortality, trench composting, composting

Scientific Abstract:

Animal mortality management continues to pose a significant challenge during the response to animal disease outbreaks. Specifically, scavenger activity around mortality management sites is a growing concern in biosecurity. To address this challenge, a research study was designed to identify mitigations that are currently being used and evaluate their effectiveness under a variety of field conditions. This study evaluates the effectiveness of a motion-activated inflatable deterrent (Scare Dancer), a real vulture effigy, a fake vulture effigy, and electric fencing as deterrents to avian and terrestrial scavengers. Both real and fake vulture effigies were effective at deterring Turkey Vultures and Black Vultures from mortality sites, but not other avian visitors (Red-tailed Hawk, Red-shouldered Hawk, and other passerine species). A motion-activated inflatable deterrent did reduce visitation by avian scavengers, but not as well as effigies. A portable electric fence was effective at reducing terrestrial scavenger visitations to mortality sites. These data are a valuable first step in better understanding the effectiveness of various scavenger deterrents in managing mortality.

Introduction:

Animal mortality management continues to pose a significant challenge during the response to animal disease outbreaks. Mortality management concerns span a broad range of issues, such as environmental impacts, costs, equipment availability, and biosecurity. Biosecurity is of utmost concern for all carcass disposal methods. With off-site disposal, biosecurity during transport is the primary concern. For on-site carcass disposal methods, the management of disease vectors becomes a greater challenge.

Scavenger activity around mortality management sites has always been a concern. During the 2022 outbreaks of Highly Pathogenic Avian Influenza (HPAI), concerns about the transmission of HPAI through scavenger activity increased significantly due to the greatly expanded number of animal species shown to be infected and shedding the HPAI virus. Vultures, for example, are commonly drawn to carcass disposal sites, but were not previously known to be a significant reservoir or transmitter of the virus. With the current strain of HPAI, infections and mortality in vultures are quite common, making spread from farm to farm a significant concern. Likewise, disease spread via the movement of infective parts by terrestrial scavengers is possible and needs to be addressed

For animal diseases like highly pathogenic avian influenza (HPAI) and African Swine Fever (ASF), scavenger activity at the carcass disposal site poses a significant risk for disease transmission. Unfortunately, little research has been conducted to validate the effectiveness of mitigations to prevent scavenger activity at compost windrows and Shallow Burial with Carbon (SBC) sites.

To address this challenge, the team designed a research study to identify mitigations that are currently being used and evaluate their effectiveness under a variety of field conditions. Mitigations were assessed on their effectiveness in mitigating scavenger activity from both scavenging birds and terrestrial wildlife such as foxes, coyotes, domestic dogs, etc. Test locations included poultry and livestock mortality management sites and both composting and modified Shallow Burial with Carbon (SBC) disposal methods.

Objectives:

1. Determine the relative effectiveness of several deterrent methods in dispersing scavengers away from compost piles.

2. Determine how the effectiveness of each deterrent method changes through time.

We evaluated the effectiveness of deterrent methods that span a wide cost and effort gradient, including:

1. Fake vulture effigies. Fake vulture effigies are a transportable, low-cost / low-effort deterrent method.
2. Real vulture effigies. Real vulture effigies are a low-cost / low-effort deterrent method—however, they require a permit to obtain, which adds difficulty and time lag for the average operator.
3. Scary man effigies. The scary man effigies are a transportable, low-cost / low-effort deterrent method.
4. Electric fencing. The electric fencing deterrent is a high-cost / high-effort deterrent method and focused primarily on terrestrial scavengers.

We quantified wildlife use of compost sites by counting the number of both Turkey Vultures (*Cathartes aura*) and Black Vultures (*Coragyps atratus*) and coyotes (*Canis latrans*) photographed by game cameras. We also evaluated other mammalian scavengers such as northern raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), and black bear (*Usrus americanus*). We considered clusters of photos obtained within 10 minute of each other as a single detection event and counted the maximum number of individuals photographed during each detection event. To standardize detection rates across different size sites, our response variable was counts of individuals per camera trap day.

Background and Purpose

The purpose of this project was to establish research that evaluates the effectiveness of deterrent methods that discourage scavenger wildlife from disturbing livestock and poultry mortality composting and burial sites. The proposed deterrent methods were classified as “low effort” options and served as a psychological or physical barrier to scavenger access to the sites.

A total of three research sites were selected. Efforts were made to locate active mortality sites on working farms, and a mock mortality event was replicated on two of West Virginia University’s Experiment Stations. Deterrent methods included scary man effigies, real vulture effigies, fake vulture effigies, and electric fencing. Commercial game cameras were utilized to monitor wildlife scavenger activity at the locations. A control period was used to determine the frequency of wildlife usage of the site without deterrents present.

This project expands the current knowledge base of methods to deter wildlife scavengers from livestock mortality composting and burial sites. It improves the knowledge of livestock and poultry producers to better manage disposal sites to prevent the potential spread of disease to other sensitive animal populations.

These deterrent techniques have been shown to be effective in various wildlife conflict situations. However, they had never been tested in these unique circumstances. This applied research built upon best practices currently in use and focused its application on biosecurity and disease management. This project relied heavily on stakeholder involvement and incorporated private farms along with commercial production sites as study sites to ensure practical, real-world scenarios. This project quantified techniques that are relatively inexpensive but perceived as less effective with more expensive techniques that are perceived as more effective. This information will help landowners decide which methods best suit their needs while also meeting their budget.

We evaluated the effectiveness of deterrent methods that span a wide cost and effort gradient. The deterrent methods evaluated included:

1. Fake vulture effigies. Fake vulture effigies are a transportable, low-cost / low-effort deterrent method. Figure 1.

Figure 1. Fake effigy hanging over modified SBC in Lewis County, WV.

2. Real vulture effigies. Real vulture effigies are a low-cost / low-effort deterrent method—however, they require a permit to obtain, which adds difficulty and time lag for the average operator. Figure 2.

Figure 2. Real Black Vulture effigy hanging over modified SBC in Monongalia County, WV.

3. Inflatable deterrent. The scary man effigies are a transportable, low-cost / low-effort deterrent method. Figures 3 and 4.

Figure 3. Scare Dancer positioned beside a modified SBC in Lewis County, WV.

Figure 4. Scare Dancer positioned beside a modified SBC in Lewis County, WV.

4. Electric fencing. The electric fencing deterrent is a high-cost / high-effort deterrent method and focused primarily on terrestrial scavengers. Figure 5.

Figure 5. Electric fence surrounding a modified SBC in Monongalia County, WV.

Materials & Methods:

Our first study site was a poultry broiler farm with regular mortality, which utilizes a covered but not completely enclosed compost bin for stage 1 composting. Because the bins were not fully enclosed, scavengers had full access to mortality. Some carcasses were exposed, serving as attractants to both avian and mammalian scavengers. This has been a long-term mortality location, and scavengers (both avian and mammalian) were frequent visitors to the bin.

Our second and third study sites were artificial mortality piles created to mimic a Shallow Burial with Carbon (SBC) site created in response to a hypothetical disease outbreak. These were modified to just lay on top of the ground, because we did not have equipment to dig a shallow pit. Two piles were located at a WVU farm in Lewis County, West Virginia, and the third was located on the WVU Research Farm in Monongalia County, West Virginia. We constructed two piles in Lewis County to compare treated and untreated piles at the same time. All piles consisted of a two-foot-thick woodchip mulch base and covered with a one-foot woodchip mulch cap. To determine efficacy of deterrent methods in the absence of proper composting methods, some carcasses were left exposed to attract scavengers. The Lewis County mortality pile utilized deer carcasses provided by crop depredation permits and hunter-harvested carcasses. The Monongalia County compost pile utilized 28-day old chicken and turkey poults euthanized during ongoing research projects.

Two motion-activated cameras (Bushnell DS-4K) were placed at each mortality pile, one facing north and one facing south to avoid early- and late-day glare. Each camera was set on a one-minute delay and captured a three-photo burst. We defined individual visits as photos with greater than 10 minutes between photos. We calculated visits per day and the average number of animals per visit. To test the efficacy of each deterrent, we compared average visits before deployment to average visits after.

For our vulture effigies, we obtained a real vulture effigy from USDA Wildlife Services under their federal permit through their ongoing Vulture Damage Management Program on the WVU Experiment Station. For our fake vulture effigy, we chose life-like fake vulture effigies (Tenceur 1 Piece Faux Vulture Effigy 18" Large Fake Vulture; approximately $55 each) because of their relatively low price and availability.

We chose the Scare Dancer® (Air Crow® LLC, Lake Charles, LA, USA) as our inflatable deterrent for testing due to its portable size, ability to be battery powered/solar, options for intermittent operation via motion sensor or timer, and reported effectiveness at repelling vultures (Kleuver et al 2024). The Scare Dancer® was equipped with a 1.83-meter inflatable tube and mounted approximately one meter off the ground on a t-post. The unit was powered using a 12 V 12AH Sealed Lead Acid

(SLA) rechargeable battery. We purchased the Plot Protector Pro from scare-dancer.com (approximately $355 each). These devices are also equipped with a strobe light and siren used to deter animals, but we only used the motion activated air dancer due to proximity to livestock. Finally, we utilized a PermaNet® Plus 12/48/3 portable electric fence ($546 each; Premier 1 Supplies) as our physical exclusion for mammalian scavengers.

Results:

Monongalia County Farm

The first SBC site in Monongalia County was constructed without any exposed carcasses to determine the baseline of scavenger activity. No repellents were added, and over a 30-day period, we only recorded one raccoon visit (one individual per visit; 0.03 visits per night) and four coyote visits (one animal per visit; 0.13 visits per night). Due to the low visitation rates on a properly covered SBC, subsequent SBC sites were constructed with exposed mortality to serve as an attractant. On the WVU Farm SBC with exposed carcasses, we recorded visitations by Turkey Vultures (0.1 visits per day; one bird per visit), Red-tailed Hawks (0.4 visits per day; 1.08 birds per visit), and coyotes (1.6 visits per day; 1.04 coyotes per visit). Avian visitations seemed to decrease between 5-7 days after mortality was added to the pile and as the exposed carcasses decayed or were removed by other scavengers.

Hanging a fake vulture effigy over or near a SBC is considered a low-cost / low-effort deterrent method. Hanging a fake vulture effigy over a modified SBC with exposed mortality repelled both Black Vultures and Turkey Vultures for 30 days. However, a fake vulture effigy does not seem to have any effect on mammalian scavengers.

Hanging a real vulture effigy is considered a low cost / low effort deterrent method—however, they require a federal permit to obtain. Hanging a real vulture effigy over a modified SBC with exposed mortality repelled both Black Vultures and Turkey Vultures for 30 days. However, like the fake vulture effigy, a real vulture effigy did not seem to have any effect on mammalian scavengers nor Red-tailed Hawks (0.4 visits per day; 1.25 birds per visit).

A scare dancer effigy ($355/unit) is considered a low-effort deterrent method. On the WVU Farm SBC, we recorded visitations by Turkey Vultures (0.1 visits per day; one bird per visit), Red-tailed Hawks (0.4 visits per day; 1.08 birds per visit), and coyotes (1.6 visits per day; 1.04 coyotes per visit). After the deployment of the scary-man effigy, visitations by both Turkey Vultures, Red-tailed Hawks, and coyotes decreased to zero. However, visitations by opossums (0.03 visits per day; one opossum per visit) and skunks (0.06 visits per day; one skunk per visit) increased slightly.

Electric fencing is a high-effort deterrent method and focuses primarily on terrestrial-mammalian scavengers. Constructing a portable electric fence kit powered by a solar charger was effective at reducing mammalian visitations to a modified SBC. It reduced visitation rates of most mammals (red foxes, coyote, skunks) by 100%. However, one opossum (0.28 visits per day; one opossum per visit) did make it through the fence during our trial period. Using a fake vulture effigy along with the electric fence was effective at repelling both Black Vultures and Turkey Vultures.

Hardy County Farm

The compost bin located on a poultry farm in Hardy County experienced regular additions of mortality and was not fully covered. Without any repellents, we recorded Black Vultures (16.8 individuals per visit; 2.2 visits per day), Turkey Vultures (2.2 individuals per visit; 1.2 visits per day), raccoons (1.4 individuals per visit; 3.1 visits per day), Red Foxes (one individual per visit; 0.8 visits per day), and opossums (1.2 individuals per visit; 0.33 visits per day). Other recorded wildlife included domestic cats, European Starlings, Red-tailed Hawks, and a Broad-winged Hawk.

After hanging a fake vulture effigy beside the compost bin in Hardy County, Black Vulture and Turkey Vulture visits dropped to zero. However, the fake vulture effigy had no effect on mammalian scavengers, nor Red-tailed Hawks. After 30 days, we removed the fake vulture effigy, and after 20 days both Black Vultures and Turkey Vultures returned at a much slower rate of 0.15 visits per day (2.66 birds per visit) and 0.1 visits per day (1.5 birds per visit), respectively. However, after the fake vulture

effigy was returned, vulture visits actually increased for both Turkey Vultures (4.2 visits per day; 4 birds per visit) and Black Vultures (1.5 visits per day; 3.1 birds per visit).

Lewis County Farm

At the Lewis County Farm, we were able to construct 2 modified SBC sites to compare treated versus untreated sites. We added deer carcasses to both modified SBC sites with a fake vulture effigy over one and nothing over the other. The fake vulture effigy failed to reduce visitations of Turkey Vultures from the treated SBC when compared to the untreated SBC. Visitation rates of Turkey Vultures were similar with treated (0.23 visits per day; 1.5 birds per visit) and untreated (0.2 visits per day; 1.5 birds per visit).

Data for the scary-man effigy trial was compromised due to an outbreak of Epizootic Hemorrhagic Disease (EHD). During the trial, we did not detect any vultures for either site. However, carrion due to deer mortality was plentiful in the area. Likewise, we did not record a difference between mammalian scavengers between the treated and untreated sites during this time period.

Constructing a portable electric fence kit powered by a solar charger was effective at reducing mammalian visitations to a modified SBC at the Lewis County farm. It excluded all mammals over the test period. Using a fake vulture effigy along with the electric fence was effective at repelling both Black Vultures and Turkey Vultures. However, the treated site was visited by a Red-shouldered Hawk during the treatment period. Visitation rates differed slightly between the treated (0.05 visits per day; one bird per visit) and untreated (0.15 visits per day; one bird per visit) sites for the Red-shouldered Hawk.

Discussion:

Scavenger activity is not only a biosecurity concern during catastrophic mortality events, but also for routine mortality management at livestock and poultry operations. Mortality management at these operations has less oversight, which has, at times, led to poor management of carcass disposal activities. The lack of effective scavenger mitigations at the farm level has the potential to be a source of regional disease transmission. Many techniques have been successfully used to deter vultures from airports, communication structures, and roosting sites (Kluever et al 2020). Likewise, many techniques have been implemented to successfully deter mammalian predators (Hygnstrom et al 1994).

Proper disposal/composting techniques are the first steps in minimizing scavenger interactions when dealing with regular mortality or catastrophic mortality events. Properly covering mortality will reduce attractions that lead to negative interactions with scavengers. Information and education programmers need to work with local producers to ensure that they receive the appropriate information and technical guidance on carcass disposal and management. Not all scavenger interactions will be eliminated by proper disposal; as such, we need to provide information not only on proper disposal, but also on the appropriate scavenger mitigation techniques and availability of resources to increase effectiveness of proper composting.

Real and fake vulture effigies have shown effectiveness at dispersing vulture roosts and protecting livestock and property from damage (Tillman et al 2002). However, effigies are not always effective at dispersing vultures (Tillman et al., 2002), especially when strong attractants are nearby. Both real and fake effigies seem to work best in novel situations. However, we found that over time, vultures became habituated to the fake effigy, thus reducing its effectiveness over long periods or after repeated use (small mortality/compost sites with regular additions of mortality). The use of more advanced scare techniques such as pyrotechnics may be warranted if long term use of an effigy is necessary. Costs associated with fake effigies range from $50-$75 each. However, you do not need a federal permit for their use. A landowner must apply for and receive a federal permit to “take” a Black Vulture or Turkey Vulture (like all migratory avian species). To use a real effigy, a landowner must consider the time involved in permitting and the cost of permitting. Landowners can also work with USDA Wildlife Services (a federal wildlife damage program found in all states) to employ their services to manage vultures.

The addition of portable-electric fencing greatly reduces visitations by mammalian scavengers. These must be maintained in order to ensure effective voltage and that no gaps exist. Coupling the electric fence with other passive avian deterrents does show promise in effectively reducing scavenger visitations to mortality sites. These portable electric fence kits are relatively

affordable, with one kit covering 625 square feet costing around $546 (our version). There are other fencing options available, and these kits are scalable for larger sites.

With a greater understanding of the scavenger mitigations that are effective at carcass management sites, emergency responders and agricultural practitioners can implement these practices to minimize the lateral spread of infectious animal diseases.

Future Direction

The results of this pilot project are intended to guide future research. Based on the limited number of replicates, we were unable to provide any powerful statistics—only descriptive results. We need to increase study sites and replicates to avoid pseudo-replication and provide more powerful statistical analysis in our results. Using the siren and strobe lights available with the scare dancer may increase effectiveness over only using the inflatable dancer. All of our compost sites would be considered small scale (<625 square ft). We need to develop larger study sites to mimic a mass disease outbreak to test the scalability of the deterrent methods. Additionally, the outreach activities could be included in this project will educate poultry and livestock producers on the mitigations that will be effective on their operations. Efforts have and will be made to present findings from this research to local producers.

References

Hygnstrom, S. E., R. M. Timm, and G. E. Larson (editors). 1994. Prevention and Control of Wildlife Damage. 2 Vols. University of Nebraska-Lincoln.

Kluever, B. M., Pfeiffer, M. B., Barras, S. C., Dunlap, B. G. & Humberg, L. A. 2020. Black vulture conflict and management in the United States: Damage trends, management overview, and research needs. Human Wildlife Interactions. 14.

Kluever, B. M., B. A. Evans, N. M. Osterhoudt, and E. A. Tillman. 2024. Efficacy of an inflatable deterrent for reducing New World vulture human-wildlife conflict. Scientific Reports. 14-6622. https://doi.org/10.1038/s41598-024-56941-2

Tillman, E. A., J. S. Humphrey, and M. L. Avery. 2002. Use of vulture carcasses and effigies to reduce vulture damage to property and agriculture. Pages 123–128 in T. M. Timm, and R. H. Schmidt, editors. Proceedings of the 20th Vertebrate Pest Conference, Davis, California, USA.