An Overview of Rodent Control for Commercial Pork Production Operations

Introduction: The house mouse (Mus musculus), Norway rat (Rattus norvegicus), and roof rat (Rattus rattus) are common pests in and around livestock and farm facilities. Overall, the house mouse is the primary rodent pest for most confined farrow-to-finish operations. Norway rats and roof rats may affect both confinement operations as well outdoor operations such as hoop facilities, and pasture lot operations. Roof rats occupy the coastal areas of Washington, Oregon, and California, as well as a larger area along the Gulf and Atlantic Coast states from Texas east to Maryland. Roof rats are not established in the mid-western states.

Swine operations are particularly vulnerable to rodent infestations because they provide nearly unlimit-ed amounts of harborage, food, and water to rodents. It is uncommon to find a confined swine operation which does not contain at least a minor level of a mouse infestation.

When rodent infestations are not diligently managed they quickly become severe, which in turn can pose significant economic problems to a swine producer. Rodents consume and contaminate feed, gnaw on structural, mechanical, electrical and various utility components, and weaken concrete slabs and walkways via their burrowing activities. Norway rats and large populations of mice are particularly destructive to building insulation.

Rodents can also play a significant role in the maintenance and transmission of swine diseases such as leptospirosis, trichinosis, toxoplasmosis, erysipelas, swine dysentery, and others. Mice and rats can spread or accelerate the spread of established diseases from contaminated areas to uncontami-nated areas via their droppings, feet, fur, urine, saliva, or blood. As an example, mice may travel through infected manure and then contaminate the food and water of healthy animals several hun-dred feet away, or introduce a disease to nearby uninfected barns. Consequently biosecurity cannot be assured if rodents are tolerated in or around swine facilities.

Key Rodent Reproduction and Behavior: Rodents have impressive capacities for reproduction - especially in swine facilities. Thus it is important to control them early, before they reach populations that cause significant damage. For example, in a single year a female mouse produces about 6-8 litters, each litter averaging 5-6 pups. The pups reach reproductive maturity in 6-10 weeks. The Norway rat produces about 4-7 litters, averaging 8-12 pups per litter. Rats reach repro-ductive maturity between 8-12 weeks. Both rats and mice have natural life spans ranging from 5 to 12 months. The house mouse has a typical home range of 6-30 feet, while rats have home ranges of 15-100 feet, and sometimes more.

Pro-active Rodent Inspections: Conducting monthly rodent inspections of a swine facility is one of the most important good production practices a swine manager can perform. Such inspec-tions should be done on a pro-active basis (i.e., regardless of whether or not a facility has a current infestation). Because rodents, tend to be secretive and are active at night, infestations can build very quickly and can catch a producer off guard. Thus, by performing monthly inspections, minor infesta-tions or new incoming rodents can be prevented from becoming severe.

Rodents living in farm buildings are most active just after dusk and again shortly before dawn. If rodents are seen repeatedly during the day, it indicates an established infestation. To get an accurate

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assessment of the rodents at a facility, the interior and exterior premises should be inspected using a good flashlight, with the lights out at either dusk or within an hour or two of dawn. If rodents are present, the inspection will reveal the location, distribution, and severity of the infestation. The results of the inspection will also prove valuable in determining control procedures - such as the most important areas to bait or place traps. In this way, baits and the time spent baiting or trapping will be used as efficiently as possible. After a control program is in place, the inspection reveals the program’s effectiveness.

When inspecting for rat burrows, all areas around the building’s foundations and around bin slabs should be carefully checked. Inspections should also be conducted into any thick overgrown vegetation within up to a 100 ft. radius of the swine facility. To confirm whether or not a rat burrow is active, the burrows can be caved in and inspected the following day.

Practical Rodent Control Programs: Controlling rats and mice around swine facilities must be a well organized effort. Tossing a few bait packets out on a regular basis, or stuffing baits down rat burrows usually results in only harvesting rodents from the facility. Unfortunately, surviving rodents quickly replace those harvested off as a result of incomplete control programs. These types of efforts have led to a misperception in the swine industry that "you never can get rid of rodents around swine operations". But this is not entirely true. It is very possible to completely eliminate rat infestations from swine operations (and in fact, this should be the goal). For mice-especially inside confined facilities - achieving "zero mice" may not be practical, or even possible. But it is totally realistic and possible to keep mouse populations to very low numbers (e.g. less than a dozen mice) even in a large complex facility.

Facility sanitation plays a critical role in controlling rodent populations. It is obviously impractical to eliminate all food sources for rodents in and around swine facilities. Still, feed spills, or equipment malfunctions that provide rodents with unlimited amounts of food should be removed or repaired as soon as possible.

Easily accessible harborage is also one of the key elements that allows for rodent explosions. Any exterior debris such as old equipment, junk piles, old boards, and the like should be eliminated.

Controlling weeds is also important. Weeds provide rodents with food, water, nesting material, and cover from predators. By maintaining an uncluttered 3-foot weed-free gravelled perimeter around buildings, rodents cannot use these areas. Gravel should be at least 1 in. in diameter and be laid in a band at least 3 ft. wide and 1/2 ft. deep.

Where feasible, denying rodents entry to swine buildings provides long term protection. Various publications present “how-to” approaches for the rodent proofing of agricultural buildings. Many are available from county extension offices or from the Internet (e.g. www.ianr.unl.edu/pubs/wildlife/).

Eliminating Existing Infestations: Rats and mice can be eliminated or severely reduced in numbers by using poison baits (rodenticides) and/or rodent traps. In the majority of cases involving established infestations, rodenticide baits strategically placed based on the results of the rodent inspections will provide the most cost effective control.

Using Poison Baits: There are many different types of poison baits on the market, and selecting the right bait for the right job can be confusing to the swine producer.

The majority of the baits used today in livestock programs are the single feed anticoagulants containing the active ingredients brodifacoum, bromadiolone, and difethialone. As their name implies, they are capable of killing rodents in only one (or sometimes two) feedings. Multiple feed rodenticides (warfarin, diphacinone, chlorophacinone, and pival) require more feedings to kill but can be used for economy purposes and for minor infestations. For established infestations, the single feed anticoagulant baits are recommended. Assuming the baits are fresh, are well placed, and the other aspects of rodent control programs are implemented (i.e. sanitation, clutter control, weed control, etc), from a practical level, the different single dose anticoagulants will perform similarly.

The three keys to effective control using rodent baits are: 1) installing fresh baits in the rodent’s high activity areas as determined from the inspections and/or rodent signs (droppings, gnaw marks, etc); 2) placing out enough bait points to ensure the rodents readily encounter the baits during their nightly travels to gather food; and 3) matching the right bait formulation (e.g., pellets, vs. blocks, vs. packets, etc) to the specific area needing to be baited. A casual approach of putting out baits in corners of barns and buildings, or simply stuffing rodent bait packets down rat burrows will have little long term effect on rodent population reduction, regardless of the bait brand used. A guide to the use of the rodenticides and formulation is available from the National Pork Producers Council. To order the “Guide Chart for the Use of Rodenticide Baits for Swine Facilities” contact the NPPC Ordering Department at 515-223-2621.
For example, for effectively controlling mice inside confined swine operations, research has shown baits have to be placed directly in the pathways of feeding areas for the mice both on-floor areas as well as along the various off-floor areas (e.g., along wall ledges, pen dividers, off-floor utility lines, etc.). Such strategic baiting efforts are crucial to success because a significant number of mice never travel along the floors, and thus will not be subject to programs that utilize floor baiting programs only. To accomplish good on-floor and off-floor bait points for mice and rats, PVC homemade stations can be used.

For mice, one or two block baits can be secured within 2.0 inch PVC tubes cut to 12.0 inch sections. This is done by drilling 1/8 inch holes through the center top area of the PVC tube. Inside two blocks of bait can be wired in place. This tube station can now be affixed using wire or plastic zip ties onto ledges or pen dividers. Or they can be placed along floors, in ceilings and in many other areas. To use the PVC station on the floor a small piece of wood can be glued to the outside of the station to keep the station from rolling.

Both Norway rats and roof rats can be baited with PVC bait tubes as well (especially for roof rats, where baiting in elevated areas is paramount). For rats, a 3.0 or 3.5 inch PVC diameter is necessary.

It is important to note that loose pellet baits, unsecured block baits, and packet style baits are not recommended as formulations for the PVC bait tubes, because these baits will easily spill out of these stations. Also, rats and mice often drag loose and unsecured baits out of the stations, causing waste, and even possible poisoning of non-target animals. For floor baiting programs, the PVC stations can be used, or ready-to-use bait stations for both rats and mice are commercially available from livestock supply houses.

In ceilings and other hard-to-reach areas where inspections have confirmed the presence of rodents, these areas can be baited using packet style baits. Baits applied into these areas should be checked weekly and replenished as necessary. Tossing packet baits or bait blocks randomly into areas without any evidence of the presence of rodents in such areas is usually a waste of bait. Tossing new packets on top of old packets is also of no value. Rodents do not travel long distances inside buildings searching for rodent baits.

For small infestations, and or maintenance baiting, rodenticides need not be purchased in large quantities. For severe infestations however, or for large swine operations, the best economy with baits is to buy rodenticides in bulk quantities (25-40 lbs.). The best economy with formulations is with bulk pellets and bulk block baits. The new block baits as they are formulated today, are very effective in all situations - not just damp or wet areas, and offer the swine producer excellent baiting versatility.

**Baiting Rat Burrows:** To treat exterior rat burrows in a cost effective and safe manner, loose bait pellets can be inserted directly into the burrow, or permanent bait stations containing blocks, packets or loose pellets can be established nearby the burrows. Stuffing bait blocks or blocks down burrows and caving in the burrow is often inefficient, and sometimes hazardous because rats often kick out some, or all of the baits applied in this manner. Rejected baits on top of the ground the next morning, may be found by dogs, cats, wildlife and even inquisitive children.

To bait burrows correctly, 6-8 ounces of pellet baits should be installed deep into active burrow holes using long-handled spoons. The burrows should not be caved in until one week later. Burrows which are then reopened the next day should be re-baited in the same manner. Only one active burrow hole need be treated every 15 feet or thereabouts. Remember burrow systems located further away (100 ft. radius) from the buildings must also be treated.

Finally, for all programs involving rodenticides, it can’t be emphasized enough that the use of rodenticide baits will rarely be cost-effective on a long term basis if the conditions allowing rodents to enter the premises, hide, and feed at will are not addressed via comprehensive programs involving sanitation, and harborage / vegetation control.

**Rodent Traps:** For minor infestations of rats and mice, or to stem off an infestation from new incoming rats or mice, the use of traps, placed strategically where rodents have been noticed is very effective, and inexpensive. But traps are too labor intensive for anything beyond a minor infestation.

When using mouse snap traps, the trick is to set many traps for just a few mice. For example, 6-8 snap traps are recommended to capture 2-3 mice. Several dozen traps would be needed for a moderate infestation. To catch rats with traps, it is most effective if the traps are left unset but baited with a highly attractive bait (e.g., hot dogs, bacon, meat) for a couple of days until the rat takes the bait. Otherwise, rats can become very wary of the traps and avoid them altogether.

Multiple-capture live traps (also called “curiosity traps”), are effective and useful as a supplemental control method for mice...
inside feed storage rooms, or by doorways, and other entry areas where it is suspected mice are gaining entry. Curiosity traps can capture up to a dozen or more mice each evening. Mice readily enter the traps placed in their activity areas because of curiosity, thus the traps do not require any bait. A dozen (or several dozen in large facilities which have persistent mouse problems) of these traps placed in strategic locations can capture many mice, and thus help prevent mouse infestations from becoming severe. These traps must be checked and emptied on a weekly basis.

Glue boards are another type of rodent trap, and appeal to many people because they seem so easy to use. However, glue board traps are an alternative type of rodent trap, not necessarily a more effective trap. Over the long run, they are more expensive to use than the other traps. Moreover, unless they are covered, glue boards lose their effectiveness quickly in dusty and damp areas. Extremes of heat or cold also reduce their effectiveness.

**Electronic Machines:** Despite on-going advertisements claiming "new technological breakthroughs", there are currently no electronic machines utilizing ultrasonic or electromagnetic means which have any scientific data to prove they work. Buyer beware.

**Dogs and Cats:** Sometimes, rat terriers and cats are kept around swine facilities in attempts to help control rodents. Although dogs and cats will periodically kill a few rats and mice, they cannot control an already established infestation. At best, rodent-aggressive dogs and cats can be effective in preventing infestations from developing if they happen to quickly kill any new rodent immigrants that venture into an uninfested premises.

But, cats and dogs pose an additional potential for disease transmission around swine facilities, and thus these animals are not encouraged. It is also common for flea infestations to develop around swine operations which house one or more cats. Fleas from cats multiply rapidly and will readily feed on employees, who may in turn, transport fleas to their own homes and companion animals.