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AN IPM APPROACH TO RODENT CONTROL ON MIDWESTERN FARMS

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ABSTRACT: An Integrated Pest Management project in Nebraska is assisting fanners, particularly pork producers, in controlling damage caused by Norway rats, house mice, house sparrows, and starlings. A survey of pork producers to (1) determine the incidence of certain rodent and bird pests, (2) identify factors which contribute to pest damage and control, and (3) evaluate the project's impact, has been completed. Survey results are summarized. Continuing efforts to document economic damage caused by vertebrate pests are expected to enhance the program's impact.

INTRODUCTION

Integrated Pest Management (IPM) is "a systems approach to reduce pest damage to tolerable levels through a variety of techniques" (Interagency IPM Coordinating Committee 1980). The concepts and practices of IPM have been developed largely by entomologists. Field scouting and other aspects of IPM programs aimed at insects, weeds, and plant diseases have been developed by the U.S. Department of Agriculture and several other federal agencies including the Environmental Protection Agency and the Council on Environmental Quality. The USDA Cooperative Extension Service has been the major promoter of implementing IPM projects in field situations (Gold 1982).

The techniques utilized in a particular IPM program depend upon the type of pest and the resource needing protection. In dealing with vertebrate pests, different principles and considerations often apply than when dealing with insects or plant diseases, for example. The application of IPM to vertebrates is possible, but problems arise when using IPM principles developed for invertebrates; such problems are considered in detail elsewhere (Marsh 1982). It is important to note that IPM does not preclude use of toxicants and other chemicals to control pest populations. Rather, IPM seeks to use chemical and other controls, when necessary, with maximum efficiency and with a minimum of undesirable effects.

Two important goals of IPM are (1) to reduce pest populations to tolerable levels, and (2) to maintain pest populations at levels below the economic or aesthetic threshold level. These threshold levels have been defined only for a few species of nonvertebrate pests, and none have been defined for vertebrates.

A "systems approach" to pest management requires not only the use of a combination of control methods normally used by a particular discipline (whether entomology or vertebrate control) but also a broadly based interdisciplinary approach. We have endeavored to meet these goals in our Vertebrate Pest Project in Nebraska.

THE PROJECT'S GENESIS

Funds to initiate the Vertebrate Pest Project became available in Federal Fiscal Year 1978 through the USDA Integrated Pest Management program. These funds provided a way for the Cooperative Extension Service in Nebraska to meet needs of pork producers and alfalfa growers for assistance with vertebrate pests. Damage caused by house mice (Mus musculus) and Norway rats (Rattus norvegicus) in swine confinement buildings was increasing in the state, and plains pocket gopher (Geomys bursarius) damage to alfalfa crops was considered a chronic problem. Project funds permitted hiring a specialist to implement and coordinate this extension thrust.

The project began in September 1978. Initial efforts focused on developing commensal rodent control recommendations for use in swine confinement facilities. These recommendations were developed in conjunction with rodent control demonstration projects we conducted on selected hog farms in eastern Nebraska. Slides of rodent damage and control methods were taken at demonstration sites, and these visuals were useful in subsequent extension meetings. In addition, several brief extension guides on rodent control were developed for distribution by the Cooperative Extension Service offices statewide.

In Fiscal Year 1980, the project's scope was expanded to include control of starling (Sturnus vulgaris) and house sparrow (Passer domesticus) damage in and around confined livestock operations. These species cause considerable economic damage in such situations. The project's methodology, including specific control recommendations for rodents and birds, has been described in detail elsewhere (Timm 1982).

A SURVEY OF PORK PRODUCERS

A survey of pork producers was begun in 1979. Its objectives were to (1) determine the incidence of rodent and bird pest problems as perceived by producers, (2) identify factors which contribute to pest damage and successful pest control, and (3) evaluate the impact of our project on selected producers.

1982. Proceedings Tenth Vertebrate Pest Conference (R.E. Marsh, Ed.), Univ. of California, Davis, Calif.

Incidence of Rodent and Bird Pests

Of 157 pork producers surveyed, 97% reported house mice were present on their farms within the past year, and 95% reported house sparrows. Less frequently reported were starlings, rats, and pigeons (Table 1).

Table 1. Frequency of pest occurrence as reported by pork producers.

Species	Percent of Producers (N = 157)
House mouse	97
House sparrow	95
Starling	66
Norway rat	65
Pigeon	53

We asked pork producers to estimate the number of certain bird pests on their farms. Producers most commonly reported house sparrows to number more than 100 birds. Starling numbers seemed to range from merely a few birds to several hundred, and pigeons usually numbered ten birds or fewer (Table 2).

Table 2. Producers' estimates of number of bird pests present.

House sparrows		Starlings		Pigeons	
Population	% of producers* (N = 149)	Population	% of producers* (N = 103)	Population	% of producers* (N = 83)
0- 25	11	0- 25	35	0-10	76
26- 50	18	26-100	29	11-25	18
51-100	16	100-500	26	26-50	6
100+	55	500+	9		

*of producers reporting the species to be present.

Producers reported that commensal rodents were responsible for consumption and contamination of livestock feed and damage to structures including insulation in buildings (Table 3). House sparrows were most frequently blamed for being a "general nuisance," and many producers reported them to cause a general sanitation problem as well (Table 4). Starlings were considered a general sanitation problem by about one-third of the producers who reported their presence. They also were blamed for contaminating feed and water, consuming feed, and possibly transmitting diseases (Table 5). Pigeons were disliked mainly for being a sanitation problem, including contamination of livestock feed (Table 6).

Table 3. Types of damage caused by house mice and Norway rats on farms where these rodents were present.

Damage	Producers Reporting Damage (N = 150)
Structural damage (other than insulation)	38
Livestock feed consumption	28
Livestock feed contamination	28
Insulation destruction	17
Burrowing under foundations and concrete slabs	5
Other damage	

Table 4. Types of damage caused by house sparrows on farms where they were present.

Damage	Producers Reporting Damage (N = 149)
General nuisance	70
General sanitation (droppings)	58
Livestock feed contamination	19
Nests untidy or may cause fire hazard	10
Livestock feed consumption	9
Destroy insulation by pecking	5

Table 5. Types of damage caused by starlings on farms where they were present.

Damage	Percent of Producers Reporting Damage (N =103)
General sanitation	35
Livestock feed contamination	32
Water contamination	21
Livestock feed consumption	13
Suspected disease transfer	12

Table 6. Types of damage caused by pigeons on farms where they were present.

Damage	Percent of Producers Reporting Damage (N = 83)
General sanitation	43
Livestock feed contamination	17
Livestock consumption	5

Control Methods Used

Poisons were the most common method of controlling commensal rodents. Approximately 82% of all producers who reported rats and/or mice present had used rodenticides (principally anticoagulant baits) within the past year (Table 7). Traps were also used occasionally against these rodents.

Table 7. Control methods used by pork producers on farms where the species were present.

Pest species	Percent who used. . .			
	toxicants	shooting	trapping	other
Norway rats & House mice	82	1	15	10
House sparrows	10	38	2	17
Starlings	13	39	0	5
Pigeons	0	59	0	5

Shooting was the most common bird-control method reported by pork producers. Poisons were used by some producers; for example, Starlicide Complete(R) was used against starlings (Table 7). The most frequent "other" bird control method reported was the use of cats.

We asked pork producers several questions regarding preventive control measures used to discourage pests. Ninety percent of the producers reported they controlled weeds around their farm buildings. Mowing, herbicide use, and grazing were mentioned as weed-control methods used. Sixty-two percent of producers who mowed weeds reported mowing only after weeds reached 6 inches or more in height. This is probably not adequate to discourage use of weeds by rodents for protection, and heavy weed growth often obscures rodent sign (e.g. burrows, trails) around farmyards. Ninety percent of the producers indicated they make an effort to remove other rodent shelter from around farm buildings. Our inspection of swine facilities on approximately 50 farms in two counties leads us to believe producers do not remove such shelter frequently or thoroughly enough for this to be an effective rodent control measure.

We also asked pork producers if they removed house sparrow nests as a means of controlling this species. Sixty-three percent of producers reported they removed nests, but 80% of these did so less frequently than once every two weeks. Probably half of all producers who removed house sparrow nests did so too infrequently to gain benefit in terms of reducing bird numbers.

During our survey, we have also learned of a variety of other control methods used against rodents and birds by pork producers. These methods include use of toxic compounds not registered for these purposes (e.g., carbamate and organophosphate insecticides). Not only are some of these uses illegal, but they are also hazardous.

A significant number of pork producers rely on cats or dogs to keep numbers of rodents or birds at a low level. The value placed on these domestic predators by farmers may not be warranted, because in many cases cats or dogs fail to prevent or even substantially reduce pest damage. The design of modern confinement swine buildings often does not permit access by predators. Many pork producers discourage the presence of cats on their premises because of their potential role in disease transfer to swine. Some producers, however, have developed rather innovative uses of predators. One farmer built an inclined ladder and a series of "catwalks" around the rafters inside his metal machinery shed. His cats now regularly patrol the rafters and successfully eliminate roosting or nesting birds.

Project Impact

We provided information on rodent and bird control to pork producers who have sought informational assistance in this area. The presence of a vertebrate pest specialist, and the opportunity to channel information through the entire Cooperative Extension Service system in Nebraska, have multiplied our efforts. The occasional feedback we receive indicates many of our recommendations are being used by producers, and producers who give sufficient effort and care to control procedures are achieving good results.

As part of our survey, we questioned producers about some of the information we provided to them over a twelve-month period. A selected group of approximately 100 producers received a monthly newsletter which highlighted various rodent or bird-control topics. Subjects treated included "House Sparrow Control," "Use of Anticoagulant Rodent Baits," "Predators for Pest Control," "Keeping Rats and Mice Out," and "Starling Control Methods." Newsletters attempted to explain pest control principles and techniques in easily understood terms. They also gave information on where to get additional assistance for such problems. At the end of the 12-month period, these producers were asked their reaction to the newsletter. Ninety-two percent of the producers said it was helpful, at least in part. Only eight percent found no value in the information we sent.

At the beginning of our survey, and again one year later, we asked the same pork producers to indicate their first choice for help or information on a rodent or bird pest problem. The Cooperative Extension Service/County Agent was the most frequent first choice in both surveys, but the frequency with which this answer was given increased dramatically (Table 8). Producers picked feed dealers as their first choice about half as frequently in 1981 as compared to 1980. The number of producers who stated they would not seek help declined from 26% in 1980 to 2.5% in 1981.

Table 8. Producers' first choice for help or information concerning rodent or bird pest problems (percent).

Source of information	1980	1981
Cooperative Extension Service/County Agent	43	81
Feed dealer	22	11
Pest control operator	1	3
U.S. Fish and Wildlife Service	0	0
Other	8	2.5
Would not seek help	26	2.5

INCREASING PROGRAM IMPACT

There is a need to have greater impact on pork producers and others who are unaware of vertebrate damage that is occurring in their facilities. Similarly, we need to raise the awareness of those persons who see damage occurring but erroneously believe that control is either economically unjustified or more difficult to achieve than it is in reality.

To meet these needs, we are conducting laboratory trials to determine the rate at which rodents destroy typical insulated walls of livestock confinement buildings. We intend to quantify the loss of insulation value in damaged walls as well as the potential energy wasted when these buildings are heated during winter months. Such economic information should be useful in making producers more aware of the economic benefits of controlling commensal rodents in their confinement facilities.

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