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BLACKBIRD AND STARLING DEPREDATIONS AT TENNESSEE LIVESTOCK FARMS

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ABSTRACT

The distribution and magnitude of blackbird/starling depredations were investigated at 287 randomly selected livestock farms inspected once and 24 farms repeatedly inspected throughout the damage season in six selected livestock producing counties in Tennessee. Of those inspected once, 25.8% were categorized as having more than a negligible problem, including 6.3% with significant damage problems. Data on farms repeatedly inspected suggested that some damage was only intermittent, while others were sustained throughout the damage season. Starlings were the overall principal species involved in the damage problem, as well as being the species involved with the more significant and sustained problems. Although damage was widespread, an economic appraisal of damage levels suggested that significant economic losses were relatively isolated. An opinion poll of livestock producers interviewed further suggested that damage problems, particularly feed loss, is of concern to the majority of these producers; and almost half had used one or more methods to control birds.

INTRODUCTION

Losses caused by large congregations of wintering blackbirds and starlings (*Sturnus vulgaris*) are reported for cattle and hog feeding areas of Kentucky and Tennessee (Dept. of Army, 1975; Dolbeer et al., 1978). Based on an opinion survey of 2051 randomly selected farmers in 72 Tennessee counties, an estimated $4.2 million was lost to birds from consuming or spoiling livestock feed (Hobson and Geuder, 1976). Although subjective statewide damage figures are of some value, objective data on damage distribution and economic losses to individual farmers are needed to put the problem in perspective.

In winter 1979-80 a survey of bird depredations on livestock feed was conducted in six selected livestock producing counties in Tennessee. This paper reports on the distribution and magnitude of the damage during this survey and its economic significance to a subsample of livestock producers.

METHODS

Survey Design

The state was divided into three regions: eastern, central, and western; two counties were selected from each region. The reason for sampling from these regions was to achieve diversification in the type of livestock operations surveyed (dairy, beef, and swine). This was achieved by the natural distribution of operation types of region; the east was primarily dairy and the west primarily swine. The counties surveyed within each region were selected on the basis of high livestock densities, past proximity to major roosts, and past histories of bird damage at livestock farms. The counties selected were Monroe and McMinn in east Tennessee, Giles and Maury in central Tennessee, and McNairy and Henderson in west Tennessee.

From each county, 5-mile square study areas were randomly chosen until a minimum of 50 feeding operations were located per county. A feeding operation was defined as all beef and swine operations feeding some type of grain (including silage) to a minimum of 20 animals and all dairy operations. Study areas falling in national parks and other non-agricultural areas were rejected, as were operations feeding livestock in bird-proof buildings. Before the survey, feedlot operators were questioned about the type and severity of past bird problems and the amount of grain fed to livestock that would also be exposed to birds.

Sampling Bird Damage

Each feeding operation was intensively observed for one day during the principal damage season from 1 December 1979 to 1 March 1980. From those operations inspected during the first two weeks in December, four with and four without blackbird-starling activity were randomly selected from each region for twice-monthly inspections in December, January, and February.

All exposed feed sources at an operation (including feed troughs, self feeders, and storage areas) were assessed for bird activity four times a day at systematic 2-hour intervals, beginning at a randomly selected time between 0800 and 1000. These feed sources were identified and initially assessed at the beginning of each sampling period by flushing and estimating bird numbers and species composition. One feed source having the most birds on flush counts or the most grain available was selected for observation, and bird entries into this source were recorded for a 0.5-hour period. Bird entries were tallied for the four sampling periods per day to provide a 2-hour bird entry sample for each farm per day. In a few instances flush count estimates were combined with bird entry observations to project total bird entries when more than one feed source had simultaneous bird activity. Based on the distribution of estimated bird entries obtained, damage at farms was categorized into three classes of 0-99, 100-999, and 1000 or more bird entries.

Economic Significance of Bird Entry Classes

Based on an approximate feed consumption rate by starlings at 1.5 g per starling entry (Glahn et al., In Press), the average length of the damage season (90 days), and the average 1980 cost per kilogram of feed ($.17), the economic significance of the damage can be assessed (Table 1). Although consumption rate estimates are not available for the blackbird species, they were assumed to be similar. The seasonal monetary losses of feed for the median of the three 2-hour bird entry class intervals examined in this survey correspond to about $5, $50, and in excess of $300 for 0-99, 100-999, and 1000 or more bird entries, respectively. Thus, on an economic basis, the first category could be considered a negligible problem and is far below that where most control measures could be cost-effective. The second class includes farms with more than a negligible problem that may be at an economic threshold where control measures, such as buying a $35-40 bag of Starlicide Complete® (1% DRC-1339 in a ratio of one treated to nine untreated pellets, registered product of Ralston Purina Co., St. Louis, Missouri), would be cost-effective. The last class, which is open-ended, includes farms where damage is economically significant and control by most means would be cost-effective.

RESULTS AND DISCUSSION

Damage Distribution

Of 287 farms inspected once, 74 (25.8%) had more than negligible blackbird-starling activity ($>$ 100 sampled entries) at feed sources and included 18 (6.3%) that had significant damage levels ($>$1000 sampled entries, Table 2). Starlings were the primary species involved in the damage; 60 (81.1%) of the 74 farms had starling damage, but 27 (36.4%) had blackbird damage alone or in addition to starling damage. In significant damage situations ($>$1000 entries), starlings accounted for twice as many damage instances as blackbirds. Thus, starlings were not only the most common cause of damage but were involved in more of the significant damage problems. This is noteworthy because wintering blackbirds far outnumbered starlings in all regions and at times outnumbered starlings at farms. However, blackbirds appeared to be less likely to use feed troughs and feeders than starlings and were therefore less involved in damage problems. Similarly, Besser et al. (1968) indicated differential trough use between starlings and red-winged blackbirds (*Angelaius phoeniceus*) in Colorado.

On a county basis the percentage of farms with more than negligible damage ranged from 31.8% (Monroe) to 8.6% (Henderson, Table 3). Although overall damage appeared to decrease in west Tennessee, blackbird damage was slightly higher there, perhaps because blackbirds are more likely to be present at swine operations. Further inspection of the data by operation type (Table 2) indicated that blackbirds [primarily cowbirds (*Molothrus ater*)] constituted more than a negligible problem at 13.6% of swine operations compared with only 6.6% of the cattle operations. In contrast, starling damage was most often a problem at cattle operations (23.1%), particularly dairies (37.3%).

Examination of data from farms inspected twice-monthly provided further insight into the problem as well as data on the economic impact of bird damage on these selected operators. A categorized grouping of these farms with respect to consistency of damage occurrence suggests that three types of situations appear to exist (Table 4). The first group (Type I farms) appears consistently to have little or no damage throughout the damage season. The second group (Type II) characteristically has slight to moderate damage overall, but damage is intermittent and falls below negligible damage levels at some point after the first inspection. The third category (Type III) includes farms that consistently sustain moderate to high damage levels after the first inspection in early December, but absolute levels of damage were variable. The damage in all seven Type III farms was caused primarily by starlings, whereas damage at six of the eight Type II farms was caused primarily by blackbirds. Thus, it appears that both intermittent and consistent damage problems can occur in this area.

Intermittent problems may likely be the result of blackbirds and starlings invading farms during severe weather conditions; previous studies have indicated the importance of weather to livestock feed depredations (Bailey, 1966; Stickley, 1979). However, consistent damage suggests that some starlings may use certain operations as a food base. The fact that more than half of the damage problems in this subsample were intermittent suggests that many of these sporadic problems were missed from a single inspection during the main survey. Thus, although damage problems may be further widespread than the survey indicated, damage of this type is probably of less economic importance than that sustained throughout the damage season.

Because intermittent damage cannot be separated from consistent damage from the main survey of farms only inspected once, projecting losses from these data is suspect. However, one can project with confidence limits losses to farms repeatedly inspected (Table 5). Even though these losses may be exaggerated by selecting half of the farms from a strata of those having some damage initially, the percentage of operations with greater than $100 seasonal loss was still relatively small (8.3%). Further, only three (12.5%) operations had losses exceeding 5% of exposed grain fed to livestock. The maximum loss estimated was $546 and 10.4% of exposed grain. Thus, significant damage problems appear to exist but are relatively isolated.

Opinion Survey

Data from interviews with the livestock operators at the farms inspected are largely subjective but do provide insight into how the problem is perceived. Of 296 livestock operators responding when asked to rate the severity of past bird damage problems, 17% said none, 24% said slight, 33% said moderate, and 26% rated the problem as serious. Thus, more than half the operators appeared to have had some type of problem with birds in the past.

A further indication of the extent of past bird problems was the extent of control measures used. Of 297 operators responding to this question, 147 (49%) indicated they had used one or more types of control measures. Of those using control measures, 27 (18%) had used Starlicide Complete® . However, 115 (78%) used shooting, which might relate to the large extent of intermittent problems previously suggested. The only other significant control measure used was night feeding (9%); 7% used other miscellaneous measures.

When 227 responding operators were asked to rate the serious problems caused by birds at their livestock operations (including those considering more than one problem serious), 159 (70%) considered feed consumption by birds to be one of the most serious problems. Eighty-eight (39%) said contamination of feed or premises by bird droppings was of primary concern, and 42 (18.5%) said spread of disease to livestock. Similarly in a 1976 opinion survey of farmers (Hobson and Geuder, 1976), more monetary bird loss was attributed to consumption or spoilage of feed than to disease transmission.

Although these data are highly subjective, they do suggest that the majority of livestock farmers consider birds to be a problem and have taken measures to rid themselves of the problem. When one considers the potential for nuisance due to property fouling and the potential for disease transmission to livestock, it is significant that the measurable losses due to feed consumption appear to be of the most concern. However, to assess the overall potential impact of birds, these other areas of concern must be kept in mind. All these areas can be related indirectly to the type of bird activity we measured, but monetary losses are difficult to equate.

CONCLUSIONS

As with many bird damage problems in agriculture, blackbird-starling depredations on livestock feed in the Tennessee counties surveyed in this study appear to be widespread, but farmers receiving significant monetary losses were isolated. Starlings were the overall principal species involved in the damage problem, as well as being the species involved with the more significant and sustained damage problems. In contrast to starlings, blackbirds were rarely observed in feed troughs and appeared to be more of a problem in swine operations where in many instances livestock were fed on the ground. Therefore, control measures for resolving livestock feed loss problems in this area should be targeted at starlings. Since starlings make up only a small percentage of blackbird roosts, eradication programs at blackbird roosts to solve this agricultural problem may be unwarranted.

Livestock feed depredations are perceived to be, and in some instances definitely are, an economic concern to certain producers. Assessing the overall impact of this damage problem over a large geographic area is confounded by variations in damage over the winter season and indirect losses due to contamination and disease. Projections of future losses are further confounded in that damage is likely to vary greatly among areas and years due to changes in weather conditions, the distribution of wintering bird populations, and agricultural practices. Although the overall impact of this problem cannot be adequately assessed, the widespread nature of these problems as well as the potential for large indirect losses may justify the need for localized control. However, due to the diversity in the nature and extent of these problems, an equally diverse number of control strategies needs to be developed to resolve problems cost-effectively on a case by case basis.

SUMMARY

The distribution and magnitude of blackbird-starling depredations were investigated at 287 randomly selected livestock farms inspected once and 24 farms inspected twice-monthly throughout the damage season in six selected livestock producing counties in Tennessee. Of those inspected once, 25.8% were categorized as having more than a negligible problem, including 6.3% with significant damage problems. Data on farms inspected twice-monthly suggested that although some damage was intermittent, some was sustained throughout the damage season. Starlings were the principal species involved in the damage problem, as well as being the species involved with the more significant and sustained problems. Although damage was widespread, an economic appraisal of damage levels suggested that significant economic losses were relatively isolated. An opinion poll of livestock producers interviewed further suggested that

damage problems, particularly feed loss, are of concern to most of these producers; and almost half had used one or more methods to control birds.

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TABLE 1. Estimated economic significance of bird entry classes at Tennessee livestock farms inspected once during winter of 1979-80.

2-h Bird Entry Classes		Estimated Bird Entries/Day*		Daily Feed Loss**		Median Seasonal (90 day) Loss	
Class Interval	(Median)	Class Interval	(Median)	Range (kg)	Median (kg)	kg	dollars***
0-99	(50)	0-446	(225)	0-0.67	0.34	30.6	$5.20
100-999	(500)	450-4496	(2250)	0.68-6.74	3.38	304.2	$51.71
1000 +	(2973)	4500- ∞	(13378)	6.75- ∞	20.08	1806.3	$307.07

*Based on an average of 9 hours available for bird depredations.

**Based on a loss of 1.5 g/bird entry (Glahn, et al., In Press).

***Based on an average January 1980 cost @17¢/kg (11¢/kg of corn; 19.1¢/kg of mixed dairy feed; 20.5¢/kg of hog feed).

TABLE 2. Distribution of blackbird-starling entries in six selected Tennessee counties from operation types inspected once during winter of 1979-80.

Operations		Starling Entries			Blackbird Entries			Combined Bird Entries		
		0-99	100-999	1000+	0-99	100-999	1000+	0-99	100-999	1000+
Cattle	Number	117	27	8	142	9	1	114	26	12
	Percent	76.9	17.8	5.3	93.4	5.9	0.7	75.0	17.1	7.9
Swine	Number	66	6	1	63	7	3	59	10	4
	Percent	90.4	8.2	1.3	86.3	9.5	4.1	80.8	13.7	5.5
Mixed	Number	44	17	1	55	6	1	40	20	2
	Percent	70.9	27.4	1.6	88.7	9.7	1.6	64.5	32.3	3.2
Total	Number	227	50	10	260	22	5	213	56	18
	Percent	79.1	17.4	3.5	90.6	7.7	1.7	74.2	19.5	6.3

TABLE 3. Distribution of blackbird-starling entries among six selected livestock producing Tennessee counties from operations inspected once during winter 1979-80.

Region/Counties		Starling Entries			Blackbird Entries			Combined Bird Entries		
		0-99	100-999	1000+	0-99	100-999	1000+	0-99	100-999	1000+
East Tennessee										
Monroe	Number	30	9	5	41	3	0	30	9	5
	Percent	68.1	20.4	11.4	93.2	6.8	0	68.2	20.4	11.4
McMinn	Number	32	12	1	45	0	0	32	12	1
	Percent	71.1	26.7	2.2	100	0	0	71.1	26.7	2.2
Central Tennessee										
Maury	Number	35	13	1	44	4	1	35	10	4
	Percent	71.4	26.5	2.0	89.8	8.2	2.0	71.4	20.4	8.2
Giles	Number	40	9	1	47	3	0	35	12	3
	Percent	80.0	18.0	2.0	94.0	6.0	0	70.0	24.0	6.0
West Tennessee										
McNairy	Number	46	6	1	41	10	2	39	11	3
	Percent	86.8	11.3	1.9	77.3	18.9	3.8	73.6	20.7	5.7
Henderson										
	Number	44	1	1	42	2	2	42	2	2
	Percent	95.6	2.2	2.2	91.3	4.3	4.3	91.3	4.3	4.3

TABLE 5. Projected losses at 15 Tennessee livestock farms which were inspected twice-monthly and received bird damage.

Operation #	Bird entries/day	Seasonal (90 day) feed loss (kg)	Seasonal (90 day) dollar loss	Percent loss of exposed grain fed
	$\bar{X} \pm$ S.E.	$\bar{X} \pm$ S.E.	$\bar{X} \pm$ S.E.	$\bar{X} \pm$ S.E.
10	980 ± 314	132.3 ± 42.4	22.49 ± 7.20	0.18 ± 0.06
11	1544 ± 897	208.4 ± 121.1	35.43 ± 20.59	0.80 ± 0.46
12	211 ± 197	28.5 ± 26.6	4.84 ± 4.52	0.12 ± 0.11
13	590 ± 469	79.6 ± 63.3	13.53 ± 10.76	0.56 ± 0.44
14	634 ± 436	85.6 ± 58.9	14.55 ± 10.01	0.06 ± 0.04
15	194 ± 117	26.2 ± 15.8	4.45 ± 2.69	1.50 ± 0.90
16	122 ± 112	16.6 ± 15.1	2.82 ± 2.57	2.00 ± 1.82
17	1443 ± 1017	194.8 ± 137.3	33.12 ± 23.34	5.70 ± 4.02
18	1247 ± 303	168.3 ± 40.9	28.61 ± 6.95	0.31 ± 0.08
19	4163 ± 1264	562.0 ± 170.6	95.54 ± 29.00	3.90 ± 1.18
20	13507 ± 3309	1823.4 ± 446.7	309.98 ± 75.94	10.40 ± 2.55
21	3153 ± 948	425.6 ± 128.0	72.35 ± 21.76	2.10 ± 0.63
22	23812 ± 5556	3214.6 ± 750.1	546.48 ± 127.52	7.10 ± 1.66
23	2620 ± 1092	353.7 ± 147.4	60.13 ± 25.06	0.20 ± 0.08
24	812 ± 141	109.6 ± 19.0	18.63 ± 3.23	0.40 ± 0.07

TABLE 4. A categorical grouping by consistency of bird damage occurrence (bird-entries) for 24 Tennessee livestock operations inspected twice-monthly over the damage season.

Operation #	December		January		February		$\overline{X}$
	Obs. 1	Obs. 2	Obs. 3	Obs. 4	Obs. 5	Obs. 6	
Type I (no damage)							
1	7	0	5	0	41	—	10.6
2	0	0	0	0	0	—	0
3	0	0	0	0	0	—	0
4	0	0	0	0	0	—	0
5	0	0	0	0	0	—	0
6	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0
9	0	0	0	0	0	—	0
Type II (intermittent damage)							
10	160	508	71	205	312	51	217.8
11	0	7	238	213	1308	293	343.2
12	0	0	0	0	265	16	46.8
13	0	8	79	24	544	—	131.0
14	613	33	36	0	152	12	141.0
15	0	126	124	0	3	5	43.0
16	152	0	0	0	12	0	27.3
17	384	10	0	23	96	1411	320.6
Type III (consistent damage)							
18	60	261	123	316	488	415	277.2
19	1953	1628	427	709	463	371	925.2
20	1140	3339	2902	4241	5541	846	3001.5
21	127	1343	527	819	1216	172	700.1
22	7736	—	8767	3959	3256	2704	5291.6
23	86	521	1485	247	572	—	582.2
24	83	240	205	133	241	—	180.4