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Richard R. West
U.S. Bureau of Sport Fisheries and Wildlife

Jerome F. Besser
U.S. Bureau of Sport Fisheries and Wildlife

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Richard R. West* and Jerome F. Besser
wildlife Research Center
U.S. Bureau of Sport Fisheries and wildlife
Federal Center, Denver, Colorado

Populations of wintering Starlings(*sturnus vulgaris)* causing problems at cattle feedlots have been effectively reduced by broadcasting pellet baits treated with 1 % DRC-1339 (3-chloro-*p*-toluidine hydrochloride) in their feeding areas (Besser, et al., 1967; West, et al., 1967; West, 1968). Each 1% DRC-1339 pellet (averaging 70 mg in weight) contains an amount of toxicant sufficient to be lethal to a starling (DeCino, et al., 1966). Besser, et al. (1968) estimated that starlings at cattle feedlots take about half their diet from the troughs. However, during severe winter weather, many Starlings take most of their food from troughs, and some appear to obtain food from this source exclusively. Hence the present methods of broadcasting baits in feedlot aisles and pens and in preroosting areas fail to eliminate these trough-feeding birds.

Incorporating an avian toxicant into the cattle ration in the troughs would be a more effective way to bait these starlings. This method of baiting also would be the most selective, because few birds other than Starlings and blackbirds feed in troughs. Further, bait preparation would be simplified, because the feed-mixing facilties at the feedlots could be used.

Because trough-feeding starlings are known to select the high-protein pellets in cattle rations (Besser, et al., 1968), it was logical to treat this component with the toxicant. The following tests were conducted to evaluate the feasibility of trough baiting with poultry pellets treated with a toxicant and added at low rates to standard feedlot cattle rations.

METHODS AND MATERIALS

Thirteen tests were conducted to determine the optimum dilution rate of the treated pellets and the time needed to effectively reduce starling populations having access to treated cattle rations. To show precisely when birds consumed treated pellets, a fast-acting proprietary compound was substituted for DRC-1339, which requires 1 to 3 days to kill Starlings (DeCino et al., 1966). Each pellet contained *2%* of the proprietary compound, enough to be lethal to a starling.

Test Starlings were captured in January 1966 near Denver with a trap baited with cattle rations (rolled corn, silage, chopped alfalfa hay, and high-protein pellets), and the birds were maintained on this diet until tested. Each of the groups of 4 to 10 birds were offered cattle rations containing treated poultry pellets at rations of 1 pound of pellets per 1, 3, 5, or 10 tons of ration. The initial exposure period was for 3 days. In a few tests, survivors were exposed to treated rations for additional 3 to 12 day periods. In each test, 22 pounds of cattle rations were spread 2 inches deep in six 2-foot-square metal trays placed in a 6- by 8- by 6-foot cage. This arrangement afforded enough surface area to make all pellets available to the probing efforts of starlings and simulated the availability of pellets in feedlot troughs, where cattle expose additional pellets as they feed.

RESULTS AND DISCUSSION

When exposed for 3 days to a ratio of 1 pound of treated pellets per ton of ration, 90% of the Starlings were killed (Table 1). In the three tests with this ration, 40% of the birds were killed within 5.5 hours and 60% within 24 hours. The test in which 3 of 10 birds survived was continued an additional 10 days. One was killed the second day, another the third day, and the other survived.

Three of the seven tests with a ratio of 1 pound per 5 tons were continued for 12 additional days to determine if longer exposure produced more kills. Of the seven birds that survived the first 3 days of exposure, only two were killed in the 4- to 15-day period, which indicated that those birds that preferred pellets found them quickly; and that extending the period of exposure would not result in an appreciable increase in birds killed.

Although another compound was used for obtaining the precise data desired from the study, a slower-acting avian toxicant such as DRC-1339 would appear to be a more suitable candidate for the trough baiting method, because it possesses high Starling toxicity and low mammalian toxicity (DeCino, et al., 1966), and Starlings are unable to associate deaths with baiting locations. If 1 pound of 1% treated pellets were added to a ton of cattle ration, the ration would contain only 5 ppm of chemical. Calculations based on estimated amounts of rations con-

*Deceased

sumed by beef animals of various weights show that cattle would ingest a total of about 1 mg/kg of chemical if fed the treated rations for 3 days. There is strong reason to believe that this would not affect cattle, because mammals are quite resistant to DRC-1339; for example, the LD50 to rats is greater than 1,000 mg/kg (DeCino, et al., 1966). Data need to be assembled to show whether DRC-1339 is harmful to cattle and whether residues of the compound are retained in cattle flesh or milk. If the 1 pound per ton of ration treatment level proves to be safe to cattle in laboratory studies, the efficacy of the method will need to be appraised at a number of feedlots in several states to determine whether the potential indicated by these cage studies for a "final solution" to the Starling problem in cattle feedlots can be realized under field conditions.

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DISCUSSION

Question: The problem in heavily populated areas is that I'm wondering if you have considered the implications of a 90% reduction of Starlings? Has there been any indication that they might be a good depredator of insects?

Besser: The basic diet of Starlings, I'll acknowledge, is insects. I have them in my lawn, and I like them. They're doing me no harm, but think of a feedlot owner that has 700,000 of them that he's attempting to control with less than effective means at the present time. And this Kentucky-Tennessee work follows in the same vein, and the Starling appears the culprit. My stand on the Starling is that, yes, he does eat insects; but we have many birds that would be just about as effective.

Question: Does the Interior Department anticipate any studies in an attempt to reduce the amount of spill and the amount of feeding by Starlings by modifying the method by which the feed is presented to the cattle or hogs?

Answer: There are, I think, quite good methods available, but they are not adopted. The feedlot owners with open feedlot troughs, we've suggested put covers over them to exclude the Starlings. There's a covered feeder that the cattle can go into which largely excludes Starlings, but they are not popular. They are not suited to Colorado, for example, at Monford's where they have 300 acres of cattle pens; they object to anything that interferes with their feeding operation. I certainly would recommend it, and I am sure it would do the job; but getting the operator to adopt it may be something else. And I'm not sure that I blame him. I don't know how many miles of these concrete bunkers they have, and it would be a very large job to open and close them after feeding. They may feed 3 or 4 times a day.

Comment: This is a comment more in regard to the previous question than anything. Anybody here who has ever spent any time on a farm with hogs or cattle, especially with hogs, knows that even with closed feeders there's enough spillage or waste that I don't know what reduction you might get in Starling population by having a closed situation; you're not going to eliminate all the spilling.

Besser: I would agree that I think the Starlings could do very well behind the cattle They're steam-rolling a lot of these grains, and the cattle are getting more nutrition from it; but the birds still could do very well behing the animals. We had hogs behind these cattle; that was where our problem was.

TABLE 1. Kills of caged Starlings exposed to treated poultry pellets diluted with various ratios of cattle rations.

Treatment ratio (pounds treated: tons untreated)	Effectiveness of 3-day initial exposure (birds killed per birds tested)	Additional exposure	
		Number days exposed	Effectiveness (birds killed/ birds tested)
7:1	10/10	--	--
	10/10	--	--
	7/10	10	2/3
1:3	3/4	--	--
	3/4	--	--
1:5	4/5	--	--
	4/5	--	--
	3/5	--	--
	3/5	--	--
	3/5	12	0/2
	3/5	12	2/2
	2/5	12	0/3
1:10	0/5	3	0/5