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Field Trials of Alpha-Chloralose and DRC-1339 for Reducing Numbers of Herring Gulls

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Abstract.--We compared the potential of Alpha-chloralose (A-C) and DRC-1339 to reduce a nesting population of herring gulls at an industrial site in Ohio in 1988. Almost all treated baits were consumed by gulls but only about one affected gull was noted for every 10 baits consumed of either chemical. A test indicated our DRC-1339 baits. containing 3.7 - 7.4 times the published LD value, were not lethal to most captive herring gulls living in fresh water. LD values of A-C and DRC-1339 need to be more precisely estimated for gull species in fresh and salt water environments.

INTRODUCTION

Gull populations have increased in recent years in North America resulting in urban nuisance problems, agricultural crop damage and reductions in populations of other bird species that compete for nest sites (Ludwig 1966, Drury 1973, Conover 1983, Blokpoel and Tessier 1986). In the western Lake Erie region, ring-billed (Larus delawarensis) and herring (Larus aroentatus) gull populations during autumn migration have increased 20- and 6-fold, respectively, in the past 30 years (Dolbeer and Bernhardt 1986).

There are 95 chemical products currentlv registered by the U.S. Environmental Protection Agency (EPA) to control bird damage and nuisance problems in the United States (Eschen and Schafer 1986). Only four include gulls as target species: Polybwtene and Polyisobutylene - both nontoxic tactile repellents: 4Aminopyridine (Avitrol) - a lethal frightening agent; and 3-chloro-4-methyl-benzenamine HCL (DRC-1339), a toxicant. Currently, DRC-1339 can only be used by U.S. government personnel to control herring, and great black-backed gulls (Larus marinus) in the coastal nesting areas of Delaware, New York, New Jersey, Connecticut, Rhode Island, Massachusetts, New Hampshire and Maine. There are no gull toxicants registered for field use outside the coastal nesting areas of the Northeastern U.S. EPA is currently considering the expansion of the present registration to include ring-billed gulls and other geographical locations.

- USDA/APHIS/ADC operational personnel have indicated a need for expansion of present registrations or development of new chemical registrations for gull control lFagerstone and Schafer 1988). The objective of this pilot field study was to compare the potential of a presently unregistered chemical, alpha chloralose (CBH „ C1.0~) and the registered gull toxicant DRC-1339, to reduce a nesting population of herring gulls in Ohio.

DESCRIPTION OF CHEMICALS

Alpha-chloralose (A-C) is a narcotic which depresses the cortical centers of the brain but has no effect on the medulla (Borg 1955, Crider and McDaniel 1967). A-C has proven to be relatively safe in capturing birds for research (Murton et al. 1963, 1968, Crider and McDaniel 1966, 1967, 1969, Williams 1966, Williams et al. 1966, Crider 1967; Martin 1967, Crider et al. 1968, Austin et al. 1972, Cline and Greenwood 1972, Williams and Phillips 1972, 1973, Pomeroy and Woodford 1976, Holbrook and Vaughn 1985).

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A-C has also been used to reduce populations of several species of birds (without endangering nontarget species) that either were a nuisance, potential hazard to aircraft or harmful to agriculture (Anon. 1960, 1962, Thearle 1960, 1969a, 19696, Ridpath et al. 1961, Murton 1962, 1963, Murton et al. 1965, Caithness 1968, Thearle et al. 1971, Cyr 1977, Feare et al. 1981. Dolbeer 1987). Several bird and mammal species have had a LD and a ED,. [sometimes referred to as Temporary Immobilization dose (TISO) not to be confused with the therapeutic index (TI)7 established3.

The ED,„ of A-C for wild birds ranges from 5.6 - 85 mg/kg and the LD3o from 32 - 400 mg/kg with a safety factor from 3.2 - 23. The LD range for rats, cats and dogs is 200-600 mg/kg (Goldenberg 1893, Giban 1950 and 1951, Borg 1955, Ridpath et al. 1961, Schafer and Cunningham 1972, Pesticides Board 1977, Cunningham et al. 1987).

A-C has been registered as an avian control agent in Great Britain, France, New Zealand and Australia. However, limited attention has been given to the use of A-C as an agent for the capture or poisoning of gulls. Borg (1955) had a kill rate of 93'/. for herring gulls in Sweden with an A-C bait concentration of 100 mg in 80 g fish (0.125'/. A-C by weight). Caithness (1968) killed at least 85'/. of a breeding colony of 2,500 southern black-backed gulls (Larus dominicanus) in New Zealand with 5-g bread baits each containing 200 mg of A-C (3.77%. A-C by weight). Control activities on lesser blackbacked gulls (Larus fuscus) and herring gulls have been conducted at their breeding sites during egg incubation in Great Britain. A-C treated bread squares placed in nests were eaten by the adults (Mitchell 1976). However, neither the EDS~ nor LD,,,o for A-C have been established for any gull species.

Physical, chemical and toxicological properties of DRC-1339 have been summarized by DeCino et al. (1966) and Schafer (1979). DRC1339 is a slow-acting toxicant that impairs the circulatory system, causing uremic poisoning and congestion of major organs. Death can occur up to four days after ingestion. DRC1339 is registered' in the U.S. to reduce populations of several species of birds that are a nuisance or harmful to agriculture (Eschen and Schafer 1986) and since 1969 it has been used to reduce gull populations in Maine and Massachusetts (Gramlich 1969, Ladd 1970, Snow and Gramlich 19714, and Drennan et al. 1986, 1987). The only LDP. information presently available for gulls was obtained by Wetherbee (1968) for herring gulls on the east coast and estimated to be 2.9 mg/kg (Schafer 1979). However, the actual weights of the gulls tested were not considered when dosing or determining the LD

STUDY AREA AND METHODS

The study was conducted in 1988 at the Lower Lake Dock Company (LLDC), a 30-ha nesting and loafing site for herring gulls in Sandusky, Ohio adjacent to Sandusky Bay of Lake Erie (fig. 1). Gulls have created various problems at the LLDC, a coal shipping facility, primarily by causing power outages at the transformer station and disrupting workers through aggressive defense of nests and young. The LLDC is 0.4 km west of Turning Point Island, a 2.0-ha man-made island with two adjacent 4 x 450-m breakwalls, that has supported a nesting colony of herring gulls since at least 1977 (Scharf 1978, Dolbeer et al. 1988).

Prebait was made by spreading 12 g of soft margarine on a slice of soft white bread and covering with another slice. The sandwich was then pressed firmly with a flat board and sliced into 18 pieces. Each piece weighed about 3.3 g. Prebaiting was conducted on 12 and 13 April by spreading about 1,000 baits on the ground each day at various sites at the LLDC.

Baiting with A-C was conducted between 0800 and 1000 on 14, 15, 18, 20 and 22 April (table 1). A-C was mixed with the margarine to a level of 4, 8 or 16% by weight, resulting in bread baits containing 26, 53, or 106 mg of AC. Baits were placed in nests or spread out in lines at 2- to 3-m intervals where concentrations of gulls were located. Bait sites were observed to determine the time of initial bait consumption and initial reaction and immobilization.

DRC-1339 (obtained from Denver Wildlife Research Center) was mixed with margarine to a level of 1.6 or 3.2% by weight. This resulted in each bread bait containing 10.8 or 21.6 mg of DRC-1339, 3.7 to 7.4 times the LD value of 2.9 mg/kg reported for herring gulls (Schafer 1979). (Note: herring gulls in our study averaged about 1 kg in weight -see table 3). Baiting was conducted on 27 April, 3 May and 13 May in the same manner as with A-C.

3LD5. is the median lethal dose that produces death and the ED3„ is the median effective dose that produces a defined effect (e.g., capture) in half of the population to which the drug is administered and the safety factor (Therapeutic Index) is the ratio of LD3. to the ED.,o (TI=LD50/ED 50)

4Snow, W. 0., and F. J. Gramlich. 1971. Gull control, Matinicus Rock and Green Island (Petit Manan), Maine. U.S. Fish Wildl. Serv., Region 5, Memorandum. 3 pp.

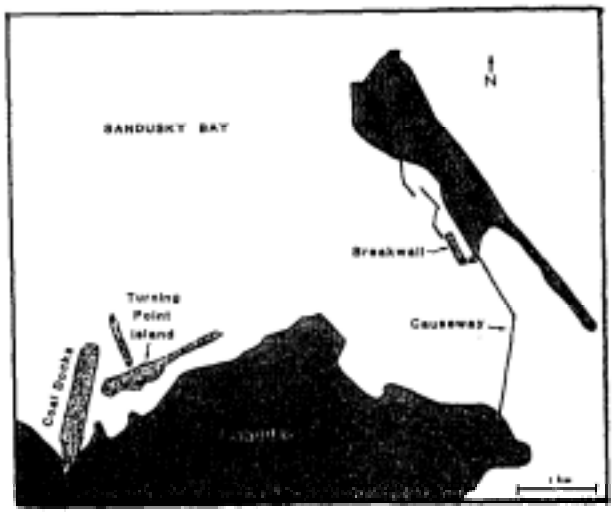

Figure I.--Map of Sandusky Bay at Sandusky, Ohio showing location of coal docks, Turning Point Island and breakwalls where herring gulls nested, 1988.

A rough estimate of the gull population at the LLDC was made at the time of each baiting by visually scanning the area with binoculars from several observation points. All baits not consumed within two hrs of placement were retrieved. After A-C baitings, the coal docks and surrounding loafing areas up to 2 km away were searched for dead or affected gulls during a 3-4 hr period. After DRC-1339 baiting, similar searches usually were made 24 hrs later and then at 1-2 day intervals for 4 days. Dead birds were retrieved and buried; incapacitated gulls were placed in a 2.5 x 2.5 x 2.0-m holding cage with food (fish offal) and water until they either recovered or died. The Ohio Division of Wildlife and the Sandusky Health Department were notified of our study and requested to report to us any dead or affected gulls brought to their attention.

On 9 May, 12 herring gulls that had been captured at LLDC with A-C baits during the April baitings were each force-fed a DRC-1339 treated bread bait and placed in a 2.5 x 2.5 x 2.0-m holding cage with food and water. Three groups of 4 gulls each received baits with 10.8, 21.6 or 43.2 mg of DRC-1339. Gulls were observed at 24-hr intervals for 4 days.

RESULTS

A-C Baitinas.--A total of 1,597 A-C baits were placed at the LLDC during the four baitings of which 1,308 were consumed primarily by gulls and a few starlings (Sturnus vulgaris) (table 1). Immobilization occurred as quickly as nine minutes after bait was consumed although most gulls did not show affects for 15 to 20 minutes. Of the 99 affected gulls retrieved, 34 survived. An additional 37 affected gulls were noted floating in the bay, but we were unable to retrieve them because of rough water. Thus, we recorded a total of 136 affected gulls or about 1 gull for every 10 baits consumed. About 1,000 gulls were at the LLDC during these baitings and the subsequent DRC-1339 baitings.

Gulls reacted to affected gulls in various ways. Often gulls would fly, spiraling high above the LLDC. On occasion, a gull would use its bill to tug at an affected mate. Most affected birds were retrieved within 1 km of the LLDC, many becoming incapacitated while in **the water of the** bay. Two immobilized gulls were found 6 to 7 km from the LLDC by individuals who brought them to us via Ohio Division of Wildlife personnel. Bait shyness from one day to the next did not appear to be a problem. However, on a given day, once gulls started reacting, feeding ceased although gulls did not abandon the LLDC.

DRC-1339 Baitings of 1,570 baits placed out during three baitings, 100'/. were eaten. almost all by gulls but also by a few starlinas (table 1). Initial deaths occurred within 24 hrs but most occurred 48 to 72 hrs after consumption (table 2). A total of 145 birds were retrieved or about one gull for every 11 baits consumed. Bait shyness was not a problem.

Almost all recoveries were within 1 km of the LLDC. Twelve decomposed gulls found dead in a field 4 km southwest of LLDC on 12 May were probably DRC-1339 poisoned gulls but they may have been A-C poisoned birds.

DRC-1339 Bioassay.--Although the lowest dose we evaluated (10.8 mg DRC-1339) was about 3.7 times the published LD 50 value for herring gulls (Schafer 1979), three of the four gulls survived. One out of 4 gulls dosed at 21.6 and 43.2 mg DRC-1339 survived (table 3).

DISCUSSION

Bait acceptance with both chemicals was excellent, with over 2,800 baits being consumed by gulls. Curiously, however, only about one dead or affected gull was found for every 10 baits consumed of either chemical, and the population of about 1,000 gulls at the LLDC showed little or no decline during the study.

For A-C, ED,. and LD ~ values have not been determined for gull species, but data for other avian species suggest that the doses we provided per bait (26 to 106 mg) should have been sufficient to immobilize a gull consuming a single bait. We know that multiple baits commonly were consumed by individual gulls, especially during the initial two baitings with A-C when we did not spread out the bait as widely as in later baitings. This may explain some of the discrepancy between baits consumed

Table 1.–Aloha-chloralose IA-CI and ORC-1339 baiting of herring gulls at Loser Lake Dock Co., Sandusky, Ohio. 1988.

Time Min.
from 1st Min. no. Of
tdi No. ofno. 0 In. MD. Of
affected Estimated

I affected affected tAt

retrieved Dulls/no. of
feeding

No of No. of WD. of t &l
chemical baits bans immobilized ord gulls not affected gulls bait
gulls atNontargets
Date Chemical Per bait' out out eaten gull
retrieved retrieved gulls surviving consumed LLDC retrieved

14 AprA-C26 288 288 15 min le 4 22 6 1:13
1.200
15 AprA-C53 372 294 14 min 13 9 22 5 1:13
1,2001 starling
(8 Agar A-C 53 246 221 16 min 16 0 16 7
1:141,000
20 AprA-C106 270 103 9 sin 6 0 6 1 10
1,0001 starling
22 AprA-C53 421 412 17 min 46 24 70 15 1:6
1.000

Total for A-C 1,597 1,308 99 37 136
34 1:10

21 Aar 1339 10.8 358 35B
24 hr 35035 0 1:10 900 1 starling
3 May 1339 10.8 600 600
24 hr 38038 0 1:16 1,100
13 May 1339 21.6 612
61224 hr 72 3 75 0 1:0 1.000
Total 1339 1,570 1.570 145 3
148 0 1:11

Total for 1339
and A-C 3.167 2.878 244 40
2841 34 1:10

'Bait was made by spreading a mixture of 12 g of A-C or DRC-1339 and soft margarine on a slice of white bread and covering with another slice. The sandwich was then pressed firmly with a flat board and sliced into IB pieces. Each piece weighed about 3.3 g and contained 10.8 to 106 s9 of A-C or DRC-1339, depending on the level of A-C or DRC-1339 in the saroarine 11.6 to 16%1.

sin addition. 6 dead or affected oulls were reported in Sandusky by the Health Department, 6 were picked up around Sandusky Bay within 2 km of coal docks and 12 were located in field 4 km from coal docks. We were unable to determine if these were A-C or DRC-1339 poisoned gulls.

and gulls affected. However, we suspect that some unknown but substantial number of gulls dispersed from the LLDC before becoming immobilized and were never located.

For DRC-1339, the doses provided per bait were 3.7 to 7.4 times the published LD value for herring gulls and each gull consuming a bait should have died. However, the bioassay we conducted with 12 gulls indicated that either the chemical used was not pure or the herring gulls on Lake Erie have higher LD 50 values for DRC-1339 than those published. Drennan et al. (1987) noted similar concerns about reduced toxicity of DRC-1339 in a program in Maine for controlling nesting populations of herring gulls and great black-backed gulls.

The fact that the population of gulls at the LLDC did not show a noticeable decline, even considering that substantially more gulls may have died than we recovered, can be explained by the large population of gulls in adjacent areas (fig. 1) such as Turning Point Island (Dolbeer et al. 1988). Gulls at the LLDC probably represented less than 10'/. of the gulls within a 4 km" area and dead gulls could have quickly been replaced. Our findings suggest that problems caused by gulls at the LLDC, such as power outages, can best be solved by erecting wire grid exclusion devices Blokpoel and Tessier 1984). Poisoning programs at LLDC to reduce populations of gulls will provide only temporary relief at best as long as the gull populations are thriving in adjacent areas.

Although we do not recommend poisoning programs as a means of solving gull problems at LLDC, we recommend further testing of both A-C and DRC-1339 on gulls to develop these toxicants for other situations. Each chemical has unique attributes that would make it preferable in particular situations. A-C is fast acting and, depending on dosage, gulls can either be killed or captured alive. Although bait shyness occurs once gulls start reacting to A-C (usually about 15 min after initial bait consumption), this shyness does not seem to carry over to subsequent days. DRC-1339 is slow acting and thus bait placement and feeding by gulls can occur over an extended period on a given day without bait shyness developing.

For A-C, ED,,,, and LD 50 values need to be more precisely estimated for gull species. For future DRC-1339 work, chemical assays should be conducted to ensure chemical purity. Also LD 50 estimates for gulls from the Great Lakes and other regions are needed. DRC-1339 primarily affects the renal system; therefore, there may be a difference in the toxicity of this chemical for gulls living in fresh and salt water environments.

Table 2.--Nuwber of dead herring gulls recovered 1, 2 and 3 or wore days after baiting with DRC1339, Lower Lake Dock Co., Sandusky, Ohio, 1988.

Date of baiting	Mg of DRC-1339/ bait	Number of gulls recovered at 24 hrs	48 hrs	>72 hrs
27 April	10.8	2		18
15 3 May	**10.8**	**3**		**19**
16 13 May	21.6	-'		-'
72				

'Searchers were not made.

Table 3.--Mortality of captive herring gulls force-fed bread baits with 1 of 3 levels of DRC-1339 on 9 May 1988, Sandusky, Ohio.

Dose (mg of DRC-1339) xSD	Weight (g) per bait	No. of Number ulls alive of gulls 24 hr	48 hr	>72
10.8				
41,053				83
433				
21.6				
4990				179
411				
43.2				
4940				58
311s				
Totals				
12 994				99

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