PRELIMINARY REPORT ON METHOXYMOL TO CAPTURE TURKEYS[1]

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ABSTRACT

A new hypnotic agent which is especially potent in birds was tested on free-feeding wild turkeys (*Meleagris gallopavo*) in Florida by oral administration on baits. One hundred thirteen were narcotized sufficiently to be captured. At the optimum dosage (4 grams of powdered drug per cup of bait) the first evidences of narcosis were noted almost immediately and some turkeys were captured within 3 minutes after beginning to feed. Narcosis wore off after 8 hours even in the more heavily drugged individuals. Mortality from overdosage was less than 3 per cent at optimum dosage levels. The new drug is clearly superior in narcotic qualities to alpha-chloralose but it is so distasteful to turkeys that they often refused to eat it.

About 1,152 wild turkeys have been captured in Florida with alpha-chloralose administered on bait since the method was first tried in 1964. The method has proven to be superior to conventional methods for the capture of turkeys in the situations in which it has been used in Florida. Its principle drawbacks are the slow rate of induction into narcosis (over 30 minutes at safe dosage levels), and a mortality rate sometimes approaching 10 per cent at minimum effective dosage (Williams 1966; and Williams, Austin, and Peoples 1966).

In response to my inquiries about faster-acting drugs Janssen Pharmaceutica in Beerse, Belgium sent a powdered sample of a new hypnotic compound called methoxymol. The results of feeding the sample to penned turkeys were encouraging and led to the field trials on free-ranging wild turkeys reported here.

Thanks are due Dr. R. Marsboom of Janssen Pharmaceutica for suggesting methoxymol and furnishing the first sample of the new drug, and to Dr. G. C. Scott of Vetco, a Johnson and Johnson Company which is affiliated with Janssen Pharmaceutica, for furnishing a supply of methoxymol for field trials and for his interest and assistance in other ways. Dr. John Kleis has furnished methoxymol for this and other studies since McNeil Laboratories began working with it a few months ago. Dr. Rudlof O. Hauck of Knoll Pharmaceutical Company kindly supplied samples of Metrazol to test its antagonistic properties. Biologist David Austin, Game Manager Jerry Peoples, Game Supervisor C. T. Lee, and James Brogdon were especially helpful in connection with the field testing. Mr. Charles Lykes and his company kindly permitted the field trials to be conducted on their Lykes Fisheating Creek Refuge property in Glades County, Florida.

METHODS

Materials and Preparations

Dosages were weighed in grams on portable scales, transferred to large containers holding dampened whole or cracked yellow corn, stirred thoroughly with large spoons, and permitted to dry for several hours before use. Bait sites were selected near turkey roosting areas and pre-baited for about a week, usually with an automatic feeder. Observers were present in nearby blinds during all experiments. The materials,

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pre-baiting procedures, and other preparations for testing methoxymol in free-feeding field trials are essentially no different from those listed in earlier reports for alpha-chloralose (see Williams 1966; Williams, Austin, and Peoples 1966; and Crider and McDaniel 1967).

Methoxymol (R-7315) is a white, finely powdered imidazole derivative of high solubility in water with a very astringent taste. It is a "new, experimental drug" by legal definition and cannot be purchased. It shows especially strong hypnotic activity in birds. Information on its chemical properties and pharmacology can be found in Marsboom, Mortelmans, and Vercruysse (1964); Marsboom, Mortelmans, and Vercruysse (1965); and Godefroi, Janssen, Van der Eycken, Van Heertum, and Niemegeers (1965).

Bait Mixtures

The first mixture tested on free-ranging wild turkeys was 10 grams of methoxymol stirred into one cup of shelled corn dampened lightly with water (methoxymol is highly soluble in water). It was apparent early in the tests that the bait was more distasteful to turkeys when it was damp than when dry. After this was learned, the bait was usually permitted to dry for about 24 hours before use.

A cellulose coating compound by Dow Chemical called Methocel (SA-1181) was tested in several free-feeding field trials to see if it would mask the distastefulness of methoxymol. It did not fully mask the taste, but when mixed at a rate of about ¼ teaspoon per cup of bait, it proved to be a very good water soluble binder for methoxymol and other drugs. (Methocel may prevent a powdered drug from "flaking off" the surface of the bait, necessitating a somewhat lower dosage than with water or other less effective binding compounds.) Methocel and information about it can be obtained from the Dow Chemical Company, Specialty Chemical Sales, Abbott Road Building, Midland, Michigan.

RESULTS AND DISCUSSION

In field tests during the winter of 1965-66 and 1966-67, 113 wild turkeys were captured on experimental dosages of methoxymol (Table 1). The rate of narcotic induction was rapid and the mortality rate

TABLE 1. RESULTS AT SIX DOSAGE LEVELS OF METHOXYMOL TO CAPTURE FREE-RANGING TURKEYS.

Drug to Bait Mixture	Number Captured	Number Died	Percent Died
3 g/cup	2	0	0
4 g/cup	38	1	2.6
5 g/cup	32	1	3.1
6 g/cup	6	3*	50.0*
10 g/cup	17	1	5.9
15 g/cup	18	3	16.7
Totals	113	9*	8.0

* Includes one moderately narcotized hen which drowned.

was low (less than three percent at minimum effective dosage levels). The narcotic characteristics of methoxymol make it clearly superior to alpha-chloralose for capturing wild turkeys.

It is sufficiently fast-acting—a faster drug than methoxymol would result in a portion of the flock becoming narcotized before the other part of the flock could take enough bait to be captured. The duration of narcosis is long enough to permit the gathering up and processing of the catch, but short enough to permit the catch to be released the same day. Its solubility makes it easy to apply to bait, and it was sufficiently stable under the field conditions encountered in this study. Its only serious drawback seems to be its bad taste to turkeys.

During the past two consecutive trapping seasons, attempts to overcome the taste factor have not been successful. One of the purposes of reporting the results of these tests at this preliminary stage is to present the data on this promising new drug with the hope that others may be able to find a way to make it more acceptable to turkeys and other species that find it distasteful, if it is made available in sufficient quantity for wildlife research.

Observations at bait sites have revealed that acceptance of methoxymol-treated bait varies markedly between species of birds. The extremes are represented by common crows (*Corvus brachyrhynchos*) which rarely swallow a kernel of treated bait, to mourning doves (*Zenaidura macroura*) which are not adversely affected by the taste when the bait is dry (see Martin's report elsewhere in these proceedings on capturing doves with drugs).

Narcosis

Dosages in the ranges tested (Table 1) produced mild narcotic symptoms almost immediately and full narcosis between three and 15 minutes after ingestion. The fastest reaction was seen in the smaller turkeys when they ate larger quantities of the heavier dosages. Adult hens taking about one-fourth cup of bait containing one gram (mixed at the rate of four grams per cup of bait) of methoxymol usually entered Stage I (Table 2) in about one minute, at which time they normally

TABLE 2. DEFINITIONS OF METHOXYMOL HYPNOTIC STAGES.

Stage I.	Light sedation: still, rigid posture interrupted by tendency to rock slightly fore and aft; able to run and fly; cannot be captured.
Stage II.	Heavy sedation or mild narcosis: pronounced loss of balance with tendency to fall backwards; unable to run well, can fly only short distance; difficult to capture by hand or with dip-net.
Stage III.	Moderate narcosis: muscular collapse usually accompanied by tremors and spread tail feathers; unable to stand, run, or fly, and oblivious to surroundings; easily captured by hand (Fig. 1).
Stage IV.	Deep narcosis or general anesthesia.

stopped feeding. Small turkeys reached Stage II in about five minutes and could be captured with a dip-net within 10 minutes.

Recovery from Stage III required less than four hours and from Stage IV between four and eight hours, depending upon the dosage and size of the bird. Most of the 113 turkeys which have been captured with methoxymol were confined in darkened boxes and were observed to see when they recovered. None of those observed showed any evidence of narcosis after eight hours.

Methoxymol-induced narcotic Stages I and II are similar to those illustrated for alpha-chloralose (Williams, Austin, and Peoples 1966). Upon reaching Stage III (Fig. 1) under methoxymol, some turkeys experienced violent tremors and usually spread their tail feathers widely. When the tail spread, the turkey could be picked up easily by hand.

In field trials turkeys ate methoxymol-treated bait more readily on mornings when there was no dew, and in the afternoon. This may have been related to humidity. On several occasions when dew-fall was heavy, treated baits were placed in two groups: some in the open air on ground dampened by dew; and other piles under shrubbery or on ground kept dry during the night by objects placed there the day before. In each of these tests turkeys showed a greater dislike for the damper bait. But the matter was complicated by occasional instances when a flock would eagerly consume all the bait at the site when the bait was damp on mornings of normal dew fall. Sugar-methoxymol mixtures were tried in morning and afternoon but they were not taken by the turkeys any better than bait mixed with water alone.

Figure 1. Juvenile male wild turkey in typical tremors of methoxymol Stage III narcosis.

Antidotes

Small injections of 10% pentylenetetrazol (Metrazol) aqueous solution produced immediate and definite arousal reactions in five turkeys in deep methoxymol narcosis. The injections had to be repeated frequently to prevent the birds from relapsing into deep narcosis. I do not know if pentylenetetrazol will prevent death from overdosage in turkeys. In view of the wide disagreement among pharmacologists about the life-saving properties of this and other drugs designed to antagonize central nervous system depressants (Beckman 1961:319) I did not attempt to find out.

Mosby and Cantner (1956) described a device for removing drugged bait from the crops of turkeys. A similar device was tested successfully in this study.

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COMPARISON OF METHOXYMOL, ALPHA-CHLORALOSE AND TWO BARBITURATES FOR CAPTURING DOVES[1]

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ABSTRACT

Secobarbital sodium, methohexital sodium, methoxymol, and alpha-chloralose were used in field experiments to capture mourning doves (*Zenaidura macroura*) in Florida during 1966 and the spring of 1967. A total of 240 doves was caught. The four drugs are compared and the best dosage for each is given. Methoxymol proved superior to the others.

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Increased interest in mourning dove hunting in recent years has stimulated research activity on the species which involves a considerable amount of trapping primarily for banding purposes. One of the most practical ways to capture mourning doves has been with conventional cage-type wire traps, one version of which is described by Winston (1954). Wire cage traps are limited as to the number of birds which can be caught at one time in an individual trap and there is often a certain amount of physical injury to the birds due to impact with the wire which results from frantic efforts to escape. And there are situations in which wire traps cannot be used profitably, such as around cattle or other large livestock where traps may be damaged or in urban situations where the doves may be disturbed excessively in unattended traps by cats and dogs.

This study was undertaken to determine the feasibility of using oral anesthetics to capture mourning doves.

Oral anesthetics, hypnotics, and similar drugs promise to revolutionize trapping techniques for some of the more wary birds. Orally adminis-

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