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VAMPIRE BAT CONTROL 1934-1971

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Annual bovine losses resulting from vampire bat-transmitted rabies are estimated at 100,000 head in Mexico (Valdez and Atristain, 1964) and approximately 1,000,000 head throughout Latin America (Málaga, 1959). Mortality of other livestock species, debilitating daily loss of blood, and secondary infection through bite wounds, further aggravate the problem.

As recent as 1969 Dr. Bernardo Villa R., General Director, Fish and Wildlife Department of Mexico, made the following statement while on an FAO assignement to assess the vampire problem in Brazil, "no notable success has been achieved in controlling bats of the Family Desmodontidae, particularly the species Desmodus rotundus in any of the countries of tropical America". Observations like this prompted the establishment, in 1968, of a program to develop techniquess for controlling vampire bats. The project is funded by the United States Agency for International Development (USAID) and is being carried out by personnel from the U.S. Department of Interior, Denver Wildlife Research Center, Denver, Colo.,

and from the Instituto Nacional de Investigaciones Pecuarias in Mexico City. Field studies are being done in various parts of Mexico and laboratory studies are beind done in both Mexico City and Denver, Colorado, where control of pest animals has been studied for many years.

The intent of this paper is to review the conventional control methods developed since the initiation of vampire control in 1934, and to present new chemical control methods being developed by the above mentioned program.

CONVENTIONAL METHODS FOR THE CONTROL OF VAMPIRE BATS.

1) Use of lights to ward off vampires.

Sanborn (1931) was the first to report placing lights near domestic animals reduced predation by vampires. While on a collecting trip in Brazil he observed that after hanging a gasoline lantern above his horses no vampires would enter the lighted area. Though lighting areas where livestock are concentrated has had some success it is not widely used. As Greenhall (1970 reported vampires soon tolerate or

ignore weak lights and will bite on the dark or shaded side of their victims.

This method of protection is still used in Mexico. In June 1971 we visited a dairy ranch in Oaxtepec, Morelos, where the rancher has used small oil lamps around his cattle for the last 15 years. His animals were bitten anyway and less than 5 km from the ranch we found the source of his problem: a cave containing approximately 150 vampires.

2) Placing livestock in screened enclosures.

Greenhall (1970) has shown this effective in Trinidad as a means of reducing vampire predation. For a small dairy rancher this approach may eliminate his problem, but for range animals is impractical.

Lighting or screening out vampires, even if effective, are actually displacement rather than control. The repelled vampire still must feed and will seek other animals to feed on.

3) Dynamiting or gassing of caves.

This approach has been used for many years but with questionable success. Villa (1969) reports destruction

of several thousand caves in Brazil without any noticeable change in the vampire-livestock problem. In addition, Greenhall (1970) reported the use of dynamite and poison gas was discontinued in Trinidad due to their ineffectiveness as well as the human risk.

Gassing of caves, however, still continues. A bat control program has been underway in Venezuela since 1964, and the principal control technique employed is spraying bat refuges with a toxaphene and diesel oil mixture. Beneficial, non-haematophagous bats frequent the same caves as vampires and they are included in the kill. Villa (1969) found that in a similar gassing project in Brazil only 40% of the bats killed were vampires.

Dynamiting and gassing of caves certainly is not a method of choice for vampire bat control. In addition to destroying caves it is extremely indiscriminate and destructive to useful species of bats.

4) <u>Shooting vampires in their roost</u>.

Greenhall (1970) reviewed this approach at the

Fourth Vertebrate Pest Conference. This is not a practical approach as it requires knowing where the bats live and entering their roost.

5) Smoking or burning vampire refuges.

In areas where there is a scarcity or lack of caves or mines vampires roost in trees. As much of the geographical range or vampire bats is geologically structural limestone these tree roost probably accounnt for a very small percentage of vampire colonies. Locating all the hollow trees in an area where vampires may roost is impractical. Thus the approach of using fire or smoke to dislodge or kill tree roosts is very limited indeed. As with gas and dynamite, if smoke or fire are used in caves then many beneficial bats could be displaced or killed.

6) Traps

Constantine and Villa (1962) described a trap which when placed at a cave entrance caught vampires as they were entering or leaving the roost. Greenhall (1970) described modifications which have been made since the trap's innovation. The 'Constantine trap'

to be effective requires knowing and traveling to caves where vampires live which is 'its' main limitation. It is cumbersome to transport and requires trained people who can distinguish vampires from other bats. It does have the advantage of not requiring entrance in the cave and may be effective in capturing vampires, but we have had poor results using it.

7) Nets

Hand nets

The use of hand nets to control vampire bats is, also, not practical. Toccatch vampires with hand nets rqquires entering caves and the elusive behavior of the bat makes capturing them in flight very difficult.

Mist nets

Of all the conventional methods used for vampire control, mist nets have had the greatest degree of success. Mist nets are fine nylon nets that were developed to capture birds. The usual approach is to place the nets around tethered or corraled cattle, and vampires when approaching to feed become entangled in

the fine mesh. The nets can also be used at cave entrances with good success (Greenhall, 1963).

Limiting factors to 'mistnetting' vampires are the number of man-hours required, and identifying and handling the bats which is dangerous for an untrained person.

8) <u>The use of poisons.</u>

Strychnine poisoning of vampire bats by placing the poison on previous bites was developed in Trinidad (De Verteuil and Urich, 1936). The premise for this control method is vampires return to feed at wounds made the previous night by the same or other vampires.

There are presently sold in Mexico several compounds (Vampirol, Vampiricida, Melito Veneno Vampiro) to use in this method of control. All of the compounds consist of a poison (strychnine or arsenic) suspended in a sugar syrup, honey, or vaseline. Limiting factors for this approach are dangers to handlers and livestock from poisoning, and it is not practical for large cattle ranchers or where cattle are widely dispersed.

Though limited in its application this method of control has value and is one of the methods being investigated by the Vampire Bat Control Project. It will be discussed in more detail later.

In 1970 Schmidt, Greenhall, and Lopez, reported on a vampire bat control program in Mexico. They used some of the above outlined physical control methods in their study. Though effective in reducing vampire predation by 70-80% in very small areas, these methods required many man-hours, and as stated by Acha (1969), control methods aimed at location and destruction of colonies of vampire bats have never produced adquate results.

From the above examples it is quite evident the conventional methods used for vampire bat control are not effective in solving the vampire bat-livestock problem. Approaches to vampire bat control which are specific for vampires, economical, and effective are greatly needed. Vampire bats range from central Argentina northward through the Mexican tropics, and they damage ranchers of all sizes. Effective control must be

versatile enough in scope to give control under a wide variety of conditions, and indeed several methods may be required.

With these thoughts in mind the Vampire Bat Control Project began to search for more sophisticated, species-specific vampire bat control methdds, based mainly on chemicals. Three methods are now under study, and each has shown some promise in laboratory tests, field tests, or both. One method entails treating previous vampire bat bites with a control agent. Another method is based on chemicals circulating in the blood of the prey animal and are received by the vampire while feeding. In the third method, vampires carry a control agent to their roost and the agent is physically passed from one individual to another.

CHEMICAL CONTROL OF VAMPIRE BATS.

1) Control by treating old bites.

As previously mentioned this control method has been used for many years. The main limitations to this method are dangers to handler and cattle from the control

compounds (strychnine or arsenic) and it is impractical for large cattle ranchers. Our studies were concentrated on evaluating the effectiveness of killing vampire bats by placing a control compound on old bites and secondly, improving the method by substituting a control compound that is safe for handlers and livestock in place of the dangerous strychnine or arsenic.

First we determined the killing effectiveness for one of the commercially produced vampiricides sold in Mexico. Eight of 11 vampires died after receiving the compound from treated bitds. Later we repeated the experiment only substituted a safer chemical (for handler and livestock) as the control compound. In the second experiment 11 of 12 vampires died after feeding on treated cattle. lA third chemical is presently being tested which is very toxic to vampire bats but relatively non-toxic to man or livestock. In addition to this safety factor, the compound is safe to use on dairy animals as residues are not passed in the milk.

This method will be most useful for ranchers with small numbers of livestock. This will especially be true

in the case of treating dairy cattle or equines which are more gentle than range animals.

2) Systemic control.

A United States Department of Agriculture laboratory suggested five of their most effective systemic toxicants to evaluate as systemic vampiricidal agents. These compounds circulate in the blood of treated cattle and are received by the vampire bats while feeding. One of these recommended systemics whows promise as a systemic vampiricide. In laboratory studies where vampire bats have fed on treated cattle killing effectiveness has ranged from 50-100%. Present studies deal with the most efficient and economical methods for administering the drug to cattle, i.e. pour-on, injected, or feed additive.

This method will have wide application as it can be used by large and small ranchers. Systemics will not be recommended for use on dairy animals as residues are passed in the milk.

3) Control by treated vampires contaminating non-treated vampires.

This control method was developed in Denver, Colo.,

and field tested in Mexico. In the laboratory phase, one vampire bat treated with a control compound was introduced into an artificial niche containing 19 other vampires. Nineteen of the 20 bats died within two weeks after being contaminated by the treated bat. In the field study vampire bats captured with mist nets around corraled cattle, treated and released reduced vampire biting by almost 100%. In one cave study, 95 dead vampires were found after only 6 treated bats were released into the cave. It should be noted beneficial bats found in the same cave were not affected.

All the new approaches to vampire control have advantages over the conventional methods described earlier. The conventional methods normally require handling bats or entering caves. In addition several (dynamiting and gassing of caves) are destructive in nature and kill many non-haematophagous bats. None of the new methods being developed require cave work and only one requires identifying and handling of vampires. All the new approaches are species-specific for vampire bats thus are not harmful to beneficial species of bats.

Field testing for controls 1 and 2 will take place in the Fall, 1971. After evaluation it is expected the Instituto Nacional de Investigaciones Pecuarias will begin providing these methods to veterinarians for controlling vampire bats in their specific areas.

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