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PREFACE

The Office of Agriculture, Technical Assistance Bureau (TA/AGR) is issuing a series of technical papers on subjects of primary importance to the developing countries. As is the case with previous issues in this series, this one treats its subject in a general sense and it does not attempt to deal with the particular problems of a specific country.

For extended use in any country, this bulletin should be supplemented with more detailed information on the application of principles to local conditions. A version of the information provided might be prepared indicating the application of the basic principles to the particular circumstances prevailing in the individual country, upon request to TA/AGR.

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INTRODUCTION

Vampire bats are not just horror fiction. They do exist and they feed by slicing the skin of warm-blooded animals and lapping the blood. The wounds are small and blood loss is probably not as severe a problem as the secondary infections that can result. However, vampire bats cost the Latin American livestock industry an estimated 250 million dollars a year by infecting cattle with paralytic rabies. Vampire bats also transmit rabies to humans and to other animals.

Over the years, numerous methods have been tried for controlling the vampire bat-rabies problem, generally with poor success and sometimes with undesirable side effects. Now, however, two techniques have been developed that are relatively safe and effective. This paper briefly outlines the biology of vampire bats and describes how they can be controlled.

THE VAMPIRE BAT

Vampire bats feed only on blood. They live only in the Western Hemisphere, from northern Mexico to central Argentina, and are found in all Central and South American countries including the island of Trinidad. There are three kinds of vampire bats: the common vampire bat (Desmodus rotundus), the hairy-legged vampire bat (Diphylla equadata), and the white-winged vampire bat (Diaemus youngi). However, the last two species are usually rare. Only the common vampire bat is

economically important over a large area, and it is the species referred to in the remainder of this report.

Common vampire bats are medium sized--adults weigh about 1 to 1-1/4 oz and have about an 11-inch wingspan. They feed at night and roost together during the day in shelters such as caves, tunnels, mines, hollow trees, and abandoned buildings. In most areas the bats reproduce year-round, but a female usually has only one young a year. Therefore, unlike most pest species, vampire bats cannot rapidly bring their population back to former levels after it has been reduced.

Vampire bats can feed on a wide variety of birds and mammals, but the introduction of livestock into the Americas provided them with an easy and abundant food supply. Usually, when livestock are brought into their range, the bats proliferate and become pests. This process still occurs as new areas are developed for livestock in tropical America. Today, in many areas, the blood of domestic animals appears to be the vampire bat's primary food source.

CONVENTIONAL CONTROL METHODS

Modern-day attempts at vampire bat control date back to the mid-1930's. Early control methods included destroying roosts with dynamite or burning them out with flamethrowers. These methods were costly and tremendously destructive to all species of bats as well as to other kinds of animals occupying the roost sites. Later, less destructive methods were used with varying degrees of success. Some examples follow.

Various locally devised repellents, both chemical and mechanical, and gas lanterns and electric lights have been used to repel vampire bats. The bats, however, soon get used to most repellents and continue to bite. In light corrals, for example, the bats simply seek the shaded side or underside of their intended hosts. Vampire bats can also be screened out, but both the initial cost and maintenance are expensive; and the method can usually be used only for smaller animals, such as pigs or chickens, that are frequently kept in pens.

Vampire bats can be killed in their roosts by shooting, but the roosts are usually hard to locate, often difficult to reach, and often dangerous to enter when found. Therefore, this approach requires a great deal of time and effort for the results achieved.

Traps and nets can be used to catch and kill vampire bats at their roosts or around corrals. These methods, including one of the new procedures described later, require special training in bat identification and require that nets and traps receive almost continuous tending so that harmless or beneficial bats can be released. Many kinds of bats eat insects, pollinate plants, or disseminate seeds and should be protected. The difficulty of finding and getting to the roosts can be eliminated by working only at corrals, but the danger of being bitten and contracting rabies while handling bats still exists, and handlers should be vaccinated against the disease.

Poisons, arsenic and strychnine, have been used for vampire bat control. One technique involves dabbing a mixture of strychnine and

honey on fresh bites to kill vampire bats that return to previous bites to feed. The poisons are dangerous to both the livestock and the handlers, and routinely treating fresh bites is impractical for livestock owners with more than a few, relatively tame animals. Toxaphene in diesel oil has been sprayed into roost caves. This approach is undesirable because it requires finding and reaching caves with heavy equipment and, even worse, the compound indiscriminately kills all species of bats and other cave animals.

NEW CHEMICAL TECHNIQUES FOR VAMPIRE BAT CONTROL

From the examples just given, it is evident that new approaches to vampire bat control that were effective, economical on a large scale, and specific for vampire bats were needed. As a result of recent research conducted for AID, by the Denver Wildlife Research Center[1] in cooperation with the Mexican Government[2], two new techniques that meet these requirements have been developed. Both use diphenadione, an anticoagulant that interferes with normal blood clotting. The drug is applied by two different systems, each based on knowledge about the bats' habits and physiology.

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[1] Bureau of Sport Fisheries and Wildlife, Building 16, Federal Center, Denver, Colorado 80225.

[2] Instituto Nacional de Investigaciones Pecuarias, Apartado Postal

The first control technique takes advantage of the bats' habit of roosting together in close-knit colonial groups, with much physical contact and mutual grooming. Vampire bats are captured in mist nets placed around corraled livestock and, before release, the bats are treated by smearing their backs with petroleum jelly containing the anticoagulant. The treated vampire bats then fly back to their colony and spread the compound to others. All the colony members are usually contaminated by contact, and they ingest the control compound after grooming and licking themselves and each other. Since vampire bats do not normally form mixed colonies with other bat species, even those occupying the same roost site, this technique is specific for reducing vampire bat populations.

The second control technique takes advantage of the difference in toxicity of diphenadione to cattle and vampire bats--the bats are sensitive to low concentrations while cattle can stand much higher doses. A low dose of diphenadione is injected into the rumen compartment of cattle stomachs. The anticoagulant is absorbed and circulates in the treated animal's bloodstream. Any vampire bat that takes one normal feeding from a treated animal for the next 2 to 3 days will receive a lethal dose. Vampire bats generally consume 20 to 30 cc of treated blood, and reduce it through water elimination and digestion to only a few cc. Hence, the amount of anticoagulant taken is actually concentrated and absorbed into the bat's blood. The control method is not only specific for vampire bats, but kills only those that are feeding on injected cattle.

In 3 years of field testing, the new techniques have consistently reduced vampire bat attacks on treated cattle or treated ranches by 90-100 percent. Furthermore, some bite reduction is usually seen on adjacent cattle or ranches. Test results indicate that the treatments are effective for a period of more than six months, and suggest that they may be effective for a year or more in some areas. The first technique requires personnel trained in identifying, netting, and handling bats; the second requires personnel and facilities for injecting cattle. Nevertheless, their effectiveness makes them economical for both small- and large-scale control programs.

CONCLUSION

The new control techniques were developed, not to exterminate vampire bats, but selectively to reduce their populations in areas where they have become too numerous and thus pests; or where they are spreading rabies to humans or livestock. Successful reduction of vampire bat populations contributes to public health by attacking an important source of rabies, and reduces a major obstacle that has hampered the livestock industry in Central and South America.