Wildlife Control Project in Baja California

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IN BOTH urban and sylvatic rabies, the maintenance of the infection and the transmission of the disease depends mainly on the population density of susceptibles within a given area. For urban rabies control, the removal of susceptibles is accomplished by the elimination of stray and unowned dogs and the vaccination of the remainder. To ensure adequate control of urban rabies, an estimated 70 percent of the susceptible animals must be vaccinated or destroyed. This number constitutes the threshold limit below which the danger of transmission of the infection from one susceptible to another increases.

For sylvatic rabies control, the removal of susceptibles requires the destruction of the specific wildlife population to the threshold limit. In most instances this limit is empirically reached. Under conditions which preclude the danger to man or to animals of economic or biological importance, the use of poisons is the most efficient and economical means of reducing the wildlife population concerned. When poison cannot be used, such methods as shooting, trapping, and gassing are employed.

The use of sodium fluoroacetate in coyote control programs in both the United States and Mexico has had considerable success. The Pan American Sanitary Bureau, in cooperation with the U.S. Fish and Wildlife Service, began demonstration programs of wildlife control in the northern Mexican States of Chihuahua and Sonora as early as 1950. A total of 12 such demonstration programs have been carried out at intervals of 3 years. It has been found that programs at 3-year intervals are sufficient to reduce high predator populations without disrupting the ecological balance. The demonstrations in Nuevas Casas Grandes, Santa Clara, and Buenaventura in Chihuahua covered areas of more than half a million acres; as many as 18,000 wolves, coyotes, foxes, and skunks were destroyed.

In mongoose control in Puerto Rico and Grenada in the Caribbean, thallium sulphate was used. In Trinidad, strychnine is used to poison the hematophagous bats as they reopen old wounds on cattle. The choice of poison depends on the vector and the local conditions.

The elimination of rabies from a wildlife population recognized as a vector or reservoir of rabies is not accomplished by sporadic reduction programs, even when the threshold limits have been attained. The reestablishment of a sizable wildlife population in a remarkably short time, together with infiltration of healthy and infected animals from untreated areas necessitates recurrent and extensive programs of wildlife control.

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Rabies Outbreak

From September 1959 to June 1960, residents of the contiguous border areas of Mexicali Valley, Baja California, and Imperial Valley, Calif., were exposed to an explosive epizootic of rabies affecting mainly the urban dog populations of both valleys (*1*).

The emergency rabies control program to reduce street dog populations and the various programs of canine vaccination were temporarily successful. The epizootic dwindled to a few sporadic cases in both valleys.

Considerable wildlife was also infected. Reports from ranchers and livestock owners indicated that the coyote population was extremely high and that serious economic losses were caused by the depredations of these animals. Losses as high as 30 percent of newborn calves were reported by ranchers in the Tecate and Rumorosa areas. Sheep ranchers stated that the losses of sheep, lambs, and goats prevented them from pasturing their flocks at night. Ranchers in Tecate reported nine separate attacks by coyotes on persons and cattle from January to March 1961. In addition innumerable attacks on the dogs of the ranchers occurred from September 1959 to March 1961.

From the Mexicali Valley area, four separate coyote attacks on persons were reported, in addition to the numerous reports of contact and battle between coyote and dog. Many of the dogs subsequently developed rabies.

While much of this information is the recollection of individuals who live at considerable distances from the main reporting center, it nonetheless helps clarify the sylvatic and urban rabies problem. The frequency of contact between coyotes and urban and suburban dogs was a major factor in the provocation of the epizootic.

The health officers of both Imperial and Mexicali Valleys recognized the necessity of implementing a coyote control program as an important adjunct to the measures to control urban rabies already adopted in both communities.

Accordingly, in June 1960, at a meeting organized by the Pan American Sanitary Bureau, health officers from the National Health Services in Mexico, the State health departments of Baja California and California, and representatives of the U.S. Fish and Wildlife Service and the U.S. Public Health Service agreed to carry out coyote control programs in the northern Baja California and southern California areas as soon as the season of the year permitted. Winter is the best season for control efforts since the scarcity of food makes the bait more attractive to coyotes.

Coyote Control Program

The success of urban rabies control depends largely on support, cooperation, and understanding between the rabies control authorities and the public generally and the dog-owning public in particular. Equally important in the control of sylvatic rabies in this border area of Mexico is the relationship between the health authorities and the ranch and livestock owners. A spirit of cooperation has to be created as part of the advanced planning if the program is to succeed.

The distribution and placement of bait and the provision of transportation and guides constitute assistance which the livestock owner can offer to the health officer. The cooperation of the livestock owner in submitting reports on coyote population, movements, depredations, and, later, on the outcome of the program is essential. Only with great difficulty can the rabies control authorities otherwise obtain this important information.

For these and other reasons, the State health department in Baja California called a meeting of representatives of the livestock associations of Tijuana, Tecate, and Mexicali. These representatives were informed of the problem confronting the health authorities and of the benefits which the proposed coyote control program might bring to the association members, not only by control of rabies but in increased economic benefit in reduction of livestock losses.

As their contribution to the cooperative program, the livestock associations agreed to furnish trucks and drivers, guides for the bait distribution teams, 10 horses for bait, and information about future coyote contact with men or animals.

Survey of Terrain

The area selected for the control project was the northern part of the Baja California peninsula between the United States border and the 32nd parallel. This area covered 4,960 square miles. The land is divided by the Sierra Juárez and Sierra Cucapa into four zones, each with its own topographical features, fauna, and flora.

The Lower Austral Zone, comprising the coastal area to Tijuana and including Las Palmas and Rio Guadelupe Valleys, has a vege-

tation characterized by cactus. Wherever irrigation is possible, islands of agricultural production are found, though most of the zone is very arid. Trees are few and these are confined to irrigated lands and the bottoms of creeks. Several species of pocket rats and pocket mice are abundant here. The big-eared fox is common and such birds as Gambel's partridge, Scott oriole, and Lacombe thrasher are to be found.

The Upper Austral Zone extends into the Sierra Juarez where, at the higher altitudes, several species of shrubs known locally as chaparral or chamizal cover the hills. Considerable plantings of oak, pine, fir, and juniper are seen. Striped skunks, grey foxes, pocket mice, and rats of several species are present in this mountain area; such birds as the Nuttall woodpecker, black long-tailed chat, California thrasher, and the black-tailed gnatcatcher are also seen.

The subtropical zone of the Imperial and Mexicali Valleys includes the bottom land of the Colorado River and the area to the west of the river. The ecology of this area has been considerably modified by irrigation and a high density human population. The banks of the irrigation ditches and canals are overgrown with heavy shrub vegetation and these give rise to transitional areas where great numbers of birds, rodents, foxes, and coyotes find cover. In such areas feral dogs and cats have their dens.

The Laguna Salada region, the fourth main division, is situated between the Sierra Cucapa and the Sierra Juárez and is completely arid desert. Though wildlife was not evident, small rodents and mice might inhabit the area. There is a complete absence of cover in this region, and the number of coyotes or foxes did not warrant bait distribution.

Distribution of Bait Stations

The distribution of bait stations was planned to protect the populated areas in the region and to prevent the northward and southward drift of coyotes between the two States. This plan was arranged to complement the control program initiated in January 1961 by the U.S. Fish and Wildlife Service in Imperial and San Diego Counties. In this program, more than 14,000 individual strychnine baits had been laid, with good results.

Sites were chosen in each area which were geographically mutually supporting and situated in such a way that they effectively commanded the natural geographic lines of movement of coyotes north or south from the border area. For each proposed bait station, the actual dropping point was chosen with regard to the topography of the terrain, preferably at the confluence of several small valleys or in the vegetation at the bottom of small creeks along which coyotes were expected to pass. The advice of the ranchers was taken into account in this local placement of bait (see Documentation Note).

Wherever possible, no bait was laid closer than 5 miles between stations. At the specific request of the individual rancher, bait was laid as close as one-half mile from the ranch buildings.

Preparation and Distribution of Bait

The horses offered by the livestock associations of Tijuana, Tecate, and Mexicali were gathered in Tecate for slaughter. Accordingly, on February 28, 1961, the predator control group, comprising a representative of the National Health Services of Mexico, officers of the State health department of Baja California, representatives of the U.S. Fish and Wildlife Service and the Public Health Service, and members of the Pan American Sanitary Bureau, met in Tecate to prepare the bait. Six of the horses were slaughtered in the municipal slaughterhouse and, after removal of viscera, were divided into sections. Each section weighed between 40 and 70 pounds. The skin of the horse was left on each bait section for protection of the bait when laid.

The sections of bait were then transported from the slaughterhouse to a convenient, secure building where the injection of the poison into the meat could be safely and expeditiously accomplished and the meat held in storage for at least 12 hours before distribution.

Precautions were taken in selecting a bait preparation building. It had to be located away from domestic dwellings, preferably on the outskirts of town, and to have water avail-

able for cleaning, a floor of concrete or other impervious material, and adequate locks on the doors.

Items used in the preparation of the bait were protective overalls and gloves, 250-cc. hypodermic syringes, 6-inch hypodermic needles perforated along their lengths, a measuring jar for weighing out the dry sodium fluoracetate powder, and a 1-gallon mixing jar.

Sodium fluoroacetate solution for injection was prepared according to the formula of 16 gms. of the chemical to 1,200 cc. of water, or 1 ounce to 4½ quarts. This gave a final concentration of 1.6 gms. of the chemical per 100 pounds of meat, using half a pint of the solution to each bait section. To the prepared solution was added an antibiotic preparation (Biostat) to assist in the preservation of the bait by retarding putrefaction. This was added to the solution at the rate of 2 gms. per 100 pounds of bait.

The solution was injected into the fresh bait sections in such a manner that all portions of the meat were infiltrated. The meat was then raised onto wooden blocks and allowed to drain for at least 12 hours. The Tecate Police Department provided police guard for the prepared bait during the draining period.

In a similar manner in Mexicali, the other four horses were slaughtered and bait sections were prepared and stored until required.

Traveling in vehicles of the livestock association and the State health department of Baja California, the distribution teams placed the bait at 81 locations in accordance with the considerations previously described. The number of teams varied from two to five. The bait was placed in the desired location and marked with a poison warning sign. The sign, of plywood mounted on a short stake, was driven into the ground near the bait, which was laid on the ground, skin side uppermost, and fastened to a convenient shrub or tree with metal wire. The 20- by 14-inch signs were painted red, and showed a stenciled skull and crossbones and the word "Veneno," the Spanish word for poison.

When a bait was laid, its weight and geographic location were recorded. A careful note was made of its exact situation. On many occasions this was difficult because the landscape did not offer many recognizable features. Local ranchers in the areas through which the teams passed were informed of the placing of bait and were requested to look out for signs of coyote activity or dead coyotes.

Evaluation

Bait laid in the northern Baja California area at the beginning of March was revisited by representatives of the Pan American Sanitary Bureau and the State veterinarian of Baja California in May 1961.

Not all bait stations were visited, since many were difficult of access and would have required much more time than was available. Reports from the ranchers in all areas indicated that the acceptance of bait had been successful and that all pieces of bait or the remains were in place with the exception of two which had been destroyed by fire.

The only report of coyotes seen during the 6 weeks previous to the investigators' visit came from the Colonia V. Carranza area, where one of the bait stations had been destroyed. Over the period of the previous 6 weeks, no coyotes had been seen or heard. In the Presa Rodríguez area, where 10 or 12 or more coyotes had been observed daily, no more were seen. The ranchers reported that the tracks of coyotes were conspicuously absent at water holes. A dead cow left out on the range in Rumorosa had been untouched by coyotes for 3 weeks.

Dead coyotes were not frequently seen. Rancho Neji reported seeing four dead coyotes at distances of ½ to 4 miles from the bait station. The range warden at the Rodríguez Dam reported seeing eight dead coyotes. In Hechicera three dead coyotes were seen some 200 to 300 yards from the bait; the informers reported, however, with greater precision that 15 dogs had died. In Rumorosa, a considerable number of dogs were poisoned. The total is unknown. Only two dogs survived in the village.

At many of the bait stations visited by the investigators, only the bones of the bait remained. In a few cases the warning signs had been removed.

Only in one place did the bait appear to be untouched, and this was in desert country near the Laguna Salada. A considerable number of dead foxes and crows were reported. In the

Tijuana and Mexicali areas, informers reported considerable numbers of foxes and skunks dead.

Interest in the coyote control program varied considerably. The agricultural worker in the Mexicali Valley appeared to be more concerned with the loss of his dogs than with the benefits to him of a diminution of the coyote population. The ranchers of Tecate and Rumorosa, on the other hand, appeared most content with the results and are requesting the State health authorities of Baja California to repeat the program late in 1961 if necessary. In accordance with the wishes of the ranchers and in agreement with the State health authorities, uneaten bait was left in situ.

Discussion

The program of control of coyote population in the northern Baja California area as a complement to the control efforts being carried out in the Imperial Valley fully justified the expectations of the respective health departments. Notwithstanding the fact that the program was carried out somewhat later in the season than had been proposed, the virtual disappearance of coyotes from the area confirms the efficiency of sodium fluoroacetate as a poison for coyotes.

The organizers of the program had expected that relatively few dead coyotes would be found by casual observers. The coyote, in common with many other wild animals, retreats to relatively inaccessible hiding places for protection during the short period that it feels unwell after having eaten the bait. As a result, few dead coyotes were seen on the trails or roads. The ranch hand riding over the open ranges and along mountain trails, with some knowledge of the country, is likely to be more observant than the suburban agricultural worker of the cotton-growing Mexicali Valley. For this reason, there were differences in the quality of reporting in these two groups of people.

It was more than encouraging to hear from both groups that tracks of coyotes had disappeared, and their baying at night was no longer heard. A close watch is being maintained. If it becomes necessary, a further program of control may be carried out.

The total weight of bait distributed amounted to 4,449 pounds. On the basis of the reports, at least half of the bait was accepted by feral dogs, coyotes, foxes, and skunks. The estimated weight of bait eaten amounts to 2,224 pounds. In allowing conservatively 100 gms. of the bait per animal, an estimated 10,230 animals may have been destroyed.

Eighteen dead coyotes were located by the ranchers and agricultural workers. In addition some foxes and skunks were observed dead in the Tecate-Tijuana area as well as in the Mexicali Valley.

Results

Notwithstanding the use of sodium fluoroacetate close to human habitation as well as in uninhabited areas, this method was safe when used with discretion.

The results as obtained from informants and observed by the authorities show that this program was effective in reducing the wildlife and feral dog population for a considerable area around the bait station. This justifies the use of the poisoning method.

The distribution of bait over an area covering nearly 5,000 square miles was accomplished in 6 days, using the minimum number of vehicles and personnel.

The cost of the operation as it was carried out by the local authorities amounted to no more than $400. This sum included the cost of the horses donated by the livestock association, use of vehicles, gasoline, hire of guides, and labor.

REFERENCE

(1) Herbert, J. H., and Humphrey, G. L.: Rabies outbreak in Imperial County. Pub. Health Rep. 76: 391–397, May 1961.

DOCUMENTATION NOTE

A map showing the terrain and location of the bait stations in the wildlife control project in Baja California has been deposited as document No. 6960 with the American Documentation Institute Auxiliary Publications Project, Photoduplication Service, Library of Congress, Washington 25, D.C. A photoprint copy may be obtained by remitting $1.25, a 35 mm. microfilm copy by remitting $1.25. Cite document number. Advance payment is required. Make checks or money orders payable to Chief, Photoduplication Service, Library of Congress.