

Not often is the opportunity given to a health department to demonstrate so conclusively the possibilities in a well rounded and vigorously pursued antirabies program. In this instance a city undertook such a determined campaign, while the communities in the closely surrounding metropolitan area temporized. The results are clear for all but the willfully blind to see.

Mass Immunization of Dogs Against Rabies*

Its Influence on a Rabies Epizootic in St. Louis

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IN order to understand the problem of controlling rabies in the City of St. Louis, it will be helpful to consider briefly the governmental structure of the St. Louis metropolitan area. The St. Louis metropolitan area is essentially a single community, and problems such as rabies affect all segments of the area. However, politically, the metropolitan area is divided into four major units; these units are the City of St. Louis and St. Louis County, in Missouri, and St. Clair and Madison Counties on the Illinois side of the Mississippi River. Each of these units is wholly independent of the others.

The City of St. Louis, with 857,000 population, unlike most American cities, is not part of any county; it has the legal status of an independent county as well as a city. St. Louis County, which borders the City of St. Louis on the north, west, and south, is a rural and suburban area of 406,000 population;

there are more than 100 incorporated communities in St. Louis County, ranging in size up to 40,000 population. As might be expected, the county is most densely populated and most highly urbanized in the area just outside the St. Louis city limits.

In metropolitan St. Louis there are three major health jurisdictions: the St. Louis County Health Department, with authority in all areas of the county that do not have local health units; the St. Louis Health Division, covering the City of St. Louis; and the East Side Health District, with jurisdiction in East St. Louis and three adjoining townships in St. Clair County; Ill. About 115,000 people are served by the East Side Health District.

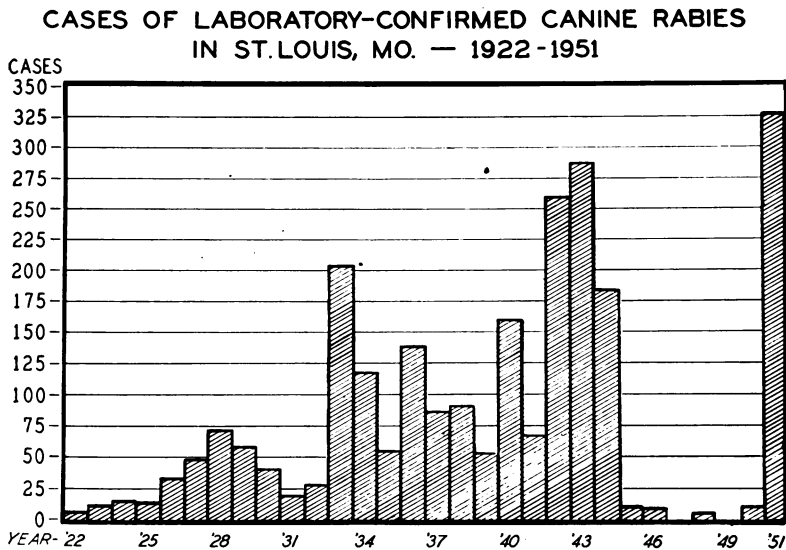
In St. Louis, stray dog control and operation of the dog pound are responsibilities of the city marshal; dog licenses are required by local ordinance and are sold through the City License Collector's Office.

There is no integrated rabies control program in the metropolitan area. With this background as an introduction, we

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FIGURE 1



can turn to the rabies problem in the City of St. Louis.

RABIES IN ST. LOUIS 1921-1950

During the period since 1921, for which we have accurate records, rabies has become an increasingly important and complex public health problem in St. Louis (Figure 1). Six rabies epizootics have occurred during that time, and each outbreak has been more serious and of longer duration than the previous one. Since 1936 there have been 1,677 reported cases of animal rabies, practically all in dogs. This is an average of 105 rabid animals per year. All cases of rabies in the City of St. Louis referred to in this report were confirmed by laboratory examination by the St. Louis Health Division Laboratories.¹⁻³

An epizootic lasting three years was experienced from 1942 through 1944; during this period there were 731 laboratory-confirmed rabid dogs. Immediately following this epizootic there occurred the most rabies-free five-year period ever recorded by the St. Louis

Health Division; during this time, 1945 through 1949, the number of cases of rabies ranged from zero to 10 per year. The years 1947 and 1949 are the only two years in the history of the Health Division when no cases of rabies were reported.

1951 EPIZOOTIC

After a rabies-free year in 1949, single cases of canine rabies were reported in January and July of 1950. In the latter half of November of the same year three more cases were reported, all from a run-down residential area; the following month, December, 1950, saw six more cases. Because of this sudden increase in rabies, the mayor of St. Louis, upon the advice of the health commissioner, issued a quarantine proclamation on December 15, 1950, requiring every dog to be restrained by a leash when on the public streets. Regulations for redemption of dogs from the city pound, which were issued to the poundmaster, required all redeemed dogs to be released to a veterinarian for a prophylactic rabies inoculation. Notwithstand-

ing this order, and in spite of increased activity by the one crew of dogcatchers, under jurisdiction of the city marshal, the number of rabid dogs continued to increase: from 11 cases of rabies in January, 1951, to a peak of 79 rabid dogs diagnosed in the month of May.

The distribution of rabid dogs over the city became more generalized, until 25 of the city's 26 health districts reported rabid dogs. The greatest number of rabid dogs came from areas in the city bordering the downtown business district—areas which have been designated as slum and blighted by the City Plan Commission. Fifty-three per cent of the rabid dogs came from six health districts located near the center of the city; 27 per cent of the city's population live in these six health districts.

It is generally accepted that the dog population of an area is directly related to the human population. Lewis and Tierkel^{4, 5} have devised an index of the probability of human infection from dogs by dividing the number of rabid dogs by the human population. This index, when applied to each of the health districts in St. Louis, shows that the probability of human exposure to rabies varies from zero to 1.53 per thousand population, with the highest exposure hazard in the poorly housed areas of the city. The exposure hazard for the city as a whole was 0.38 per thousand. The slum and blighted areas, in addition to having the highest exposure hazard to rabies, also have the densest dog population and, in the opinion of the dogcatchers, the greatest number of seemingly stray or ownerless dogs.

With the rapid increase in number and distribution of cases of canine rabies, the health commissioner conferred with the local veterinarians and called upon the state for assistance. A public health veterinarian, on loan to the Missouri Division of Health from

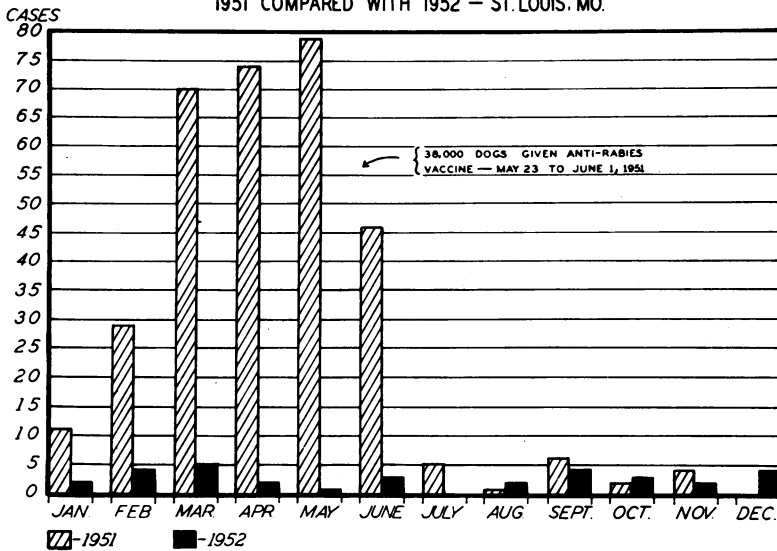
the Public Health Service, was assigned to make an investigation on May 16, 1951, and he recommended:

1. Mass immunization clinics
2. Educational program for dog owners
3. Stray dog control program be turned over to the Health Division
4. Immediate action for an ordinance requiring annual vaccination for all dogs and permanent control of the dog pound by the health commissioner

Acting upon the report and the recommendation of the health commissioner, the mayor issued on May 17, 1951, a quarantine order based upon a state law which enabled the city to require every dog in St. Louis to be immunized against rabies and confined to the owner's premises. The city also released an emergency fund of \$25,000 to be used in a mass antirabies program.

Immediate steps were taken to organize the rabies inoculation campaign. Eighteen clinic locations were selected throughout the city and a veterinarian from the Health Division was assigned as veterinary supervisor of clinics. The clinics were staffed by local veterinarians from the Greater St. Louis Veterinary Medical Association and assisted by Health Division personnel and by volunteers from various civic organizations. These clinics opened on May 23 and they were operated simultaneously from 4:00–8:00 p.m. for seven days through June 1. Thirty-eight thousand dogs were vaccinated at these clinics at a cost of \$1.00 per vaccination for those able and willing to pay. No one was turned away if he was unable to pay. Since the purpose of the clinics was to secure immunization of the maximum possible number of dogs during the emergency, all animals were inoculated regardless of the possession of a dog license by the owner. A survey revealed that approximately 20,000 additional dogs were vaccinated in the private offices of veterinarians. Thus, during the first six months of 1951,

FIGURE 2
LABORATORY-CONFIRMED CANINE RABIES
1951 COMPARED WITH 1952 - ST. LOUIS, MO.



some 58,000 dogs were immunized against rabies in the city. This is 200 per cent of the number of dogs for which licenses were issued during the entire year of 1951. From this we can see that dog license figures are of little value in arriving at dog populations. We estimate that the 58,000 dogs inoculated represent approximately 70 per cent of the city's dog population. In an average year there are less than 10,000 dog licenses issued in St. Louis.

Supplementing the immunization program, an accelerated stray dog program was activated at the close of the anti-rabies vaccination clinics. For two weeks, four trucks were on the streets on a 16-hour a day schedule. This was gradually reduced to the normal one truck, eight-hour schedule, by September 1, 1951. All unleashed dogs off the owner's premises were picked up and impounded. Dogs unclaimed after 72 hours were destroyed. Redeemed dogs without proof of vaccination were required to be inoculated before leaving the pound. All dogs at the pound were

under daily veterinary supervision during the period June 1 to September 1.

RESULTS OF MASS IMMUNIZATION

The results of this mass immunization program were sudden and dramatic as shown by the fact that in August, just two months after the closing of the clinics, only one rabid dog was reported (Figure 2) as contrasted with 79 in May. Eighteen rabid dogs were diagnosed by the laboratory for the July-December period of 1951 as compared with 309 for the first six months of the year. The incidence has remained low in 1952, and as of July 1, 1952, the total number of rabid dogs for the 12 months following the closing of the clinics was 35. For the first nine months of 1952, the total number of cases of canine rabies was 22.

DISCUSSION

Previous to 1951 the only control measures instituted were dog quarantine orders issued at various stages of the epizootics. These quarantines required

the dogs to be leashed, or confined to the owners' premises. In no previous outbreak was the vaccination of dogs required or advised, nor was veterinary assistance or consultation available to the dog pound. The health commissioner with the approval of the mayor issued the quarantine. The picking up of stray dogs and the confining of biting dogs for observation was and is the responsibility of the city marshal and poundmaster. In effect, the epizootics were allowed to run their course with a natural reduction of the susceptible dog population. The preceding epizootic required three years for the disease to run its course. During the 1951 outbreak, the most serious to date, canine rabies reached a climax and the incidence of the disease declined in six months. There has been no other period in the history of rabies in St. Louis with such a sudden reduction in the incidence of the disease.

For the period of time that data on animal rabies is available in the adjacent metropolitan areas of St. Louis, the trend of the disease in the three adjoining communities, St. Louis County, the City of St. Louis, and East St. Louis, has been similar. In 1951 East St. Louis, Ill., and St. Louis County, Mo., experienced an increase in the number of rabid dogs similar to that in the City of St. Louis. The preceding four years had been a period of low rabies incidence in the entire metropolitan area. Although sporadic vaccination clinics were opened in both these suburban health jurisdictions, no intensified and well publicized mass immunization campaign was organized. Small numbers of dogs were vaccinated over an extended period. The disease continued at a relatively high rate in both neighboring areas for the remainder of the year, while in the City of St. Louis the number of rabid dogs dropped sharply. Both adjacent communities have a much larger number of rabid

dogs in 1952 than St. Louis. In one community the number of rabid dogs in 1952 is the greatest recorded for any year. In spite of this continued high incidence in the immediately surrounding area, the City of St. Louis has a low incidence of the disease more than a year after the mass immunization program. For St. Louis, July, 1952, was a rabies-free month.

Many instances of the value of mass immunization of dogs in the control of rabies have been recorded since Umeno and Doi⁶ employed this attack upon the disease in Japan. Other demonstrations of intensified, successful organized antirabies canine inoculation programs in this country have been held in Alabama^{7, 8}; Arizona⁹; Charleston, W. Va.¹⁰; Dunklin and Greene Counties, Mo.¹⁰; Georgia¹¹; Maryland¹²⁻¹⁴; Memphis, Tenn.¹⁵; New York State^{16, 17}; and Washington, D. C.¹³ In many cases,^{6, 9, 10, 12-15, 17} the vaccination programs were inaugurated after quarantine measures alone were proved to be inadequate in controlling the disease. The literature records few long-term histories of the course of the disease preceding the vaccination programs in these communities by which to judge the normal long-range cycle of rabies. This has caused some people to question the role of canine vaccination in the reduction of the rabies incidence in the reported literature. Was the decline of rabies following the inoculation program a coincidence? We feel that the long history of the disease in St. Louis gives a good standard by which to judge the results of mass immunization.

The 1951 epizootic was the first in which the large-scale vaccination of dogs was tried and, significantly, was the first rabies epizootic to end abruptly. The entire course of the 1951 epizootic, from the original case to virtual eradication of the disease, was a matter of nine months as contrasted with previous epizootics which lasted several years.

Past history of rabies in St. Louis shows that a long period of gradual reduction in the number of cases after the peak incidence is the normal course of the disease.

Greater use of intensified, large-scale vaccinations of the dog population will control the spread of canine rabies in this country.

SUMMARY

1. A serious rabies epizootic in St. Louis, Mo., has been described and compared with preceding epizootics in the city.

2. The epizootic in the City of St. Louis was compared with the disease in the neighboring metropolitan area.

3. The incidence of rabid dogs in St. Louis has been related to the housing conditions in the various areas in the city.

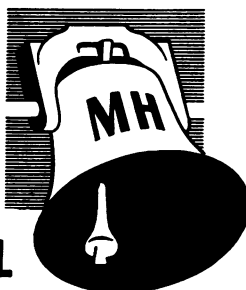
4. The effect of a mass immunization of dogs in St. Louis is evaluated.

5. An intensified vaccination program, inoculating a high per cent of the canine population in a short period of time, is shown to be of far greater value than sporadic inoculations of small numbers of dogs over an extended period in the same metropolitan area.

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