

Cattle Tick Fever

BY W. M. MAC KELLAR ¹

"THE FIGHT to eliminate the cattle fever tick from the United States is probably the most extensive and sustained campaign ever made on any of man's parasitic enemies." Today 99 percent of the formerly infested area has been freed; the once appalling losses have been practically eliminated.

IN 1906 a concerted effort to eradicate the cattle fever tick from the United States was begun. At that time and for more than a century before, this infectious disease of cattle and the parasite that transmits it were the most serious obstacles faced by the cattle industry in 15 Southern and Southwestern States the combined area of which constitutes nearly one-fourth of the United States. Conservative estimates in the early 1900's placed the losses directly and indirectly chargeable to this plague at \$40,000,000 annually.

At different times and places the disease has been known by many different names. The one by which it has been best known in the United States is "Texas fever," but this name is misleading because it gives the wholly erroneous impression that the disease originated in Texas or that it is confined to that State. It has also been known as red water, black water, southern cattle fever, acclimation fever, murrain, bloody murrain, Mexican fever, Spanish fever, splenic or splenetic fever, hemaglobinuria, bovine piroplasmiasis, and bovine malaria. Since in natural infection the disease is transmitted by one means only, the bite of the cattle fever tick (*Boophilus annulatus*), "cattle tick fever" would seem to describe it best, and this is the name now in general use in the United States.

SYMPTOMS

Cattle tick fever is a specific infectious disease of the blood of cattle, caused by the development and activity of minute animal parasites

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known as piroplasms, which are conveyed to the animals by the cattle fever tick. The disease is characterized by high fever, destruction of red corpuscles, enlarged spleen, engorged liver, thick flaky bile, more or less jaundice, emaciation, and death in 10 percent of the chronic to 90 per cent of the acute cases. A peculiarity of the disease is that the animals responsible for its spread are apparently healthy, while those that become diseased do not as a rule convey the infection to others.

A NOTABLE DISCOVERY IN MEDICAL SCIENCE

Just when or where cattle tick fever first made its appearance in the United States is not known. The generally accepted theory is that it was introduced into the West Indies and Mexico during the Spanish colonization of those countries and from there reached the southern part of the United States. What seems to be the earliest report in this country of a disease which was undoubtedly cattle tick fever was made in 1796; in August of that year there was an outbreak of a cattle disease in Lancaster County, Pa., which was attributed to a drove of cattle previously brought from South Carolina. In every instance in which these southern cattle mingled with native cattle the disease was contracted by the latter, and in one instance it was supposed to have been caused by merely placing Pennsylvania cattle on ground where the southern cattle had been penned. It was also noted that outbreaks of this strange malady invariably occurred in summer and would disappear with the first heavy frost, and that the southern cattle apparently responsible for spreading the disease seemed to be in perfect health.

About the middle of the nineteenth century similar accounts of this trouble in the West and Southwest began to be heard. This was the period of the great trail movement of cattle from Texas to the stock-raising sections of the West, and because of the enormous losses that followed in the wake of these overland movements the name of Texas became linked with the malady. Laws and regulations aimed at controlling these movements and preventing the spread of the disease were enacted by several States, but notwithstanding these local efforts the borderline of the infected area continued to advance northward. This finally led to the conclusion that the problem was of national interest, and that if the cattle industry of the North was to be protected it would be necessary for the Federal Government to establish control measures dividing the infected areas from the free areas and regulating the movement of all cattle from the areas where the disease existed.

With this in view, in 1883 a survey was undertaken in an effort to locate the northern limits of the infection, and on July 3, 1889, by order of the Secretary of Agriculture, the first national quarantine order establishing a Federal quarantine line and controlling the movement of southern cattle was issued. This quarantine and the strict enforcement of regulations to permit the shipment of southern cattle to northern markets for immediate slaughter only and under special quarantine restrictions proved quite effective in checking the

spread of the disease but did little to improve conditions in the quarantine area.

During this time many scientists were conducting investigations in an effort to solve the baffling problems presented by the disease, and in 1889 investigators of the Bureau of Animal Industry had the distinction of being the first to recognize and describe as protozoa the intracellular parasites that are the direct causative agents.

Some observing cattlemen of the West had for a long time advanced the theory that Texas fever was caused by ticks, which were carried to and scattered on the northern pastures by southern cattle. Others ridiculed this theory. The Bureau of Animal Industry decided to investigate it, and the conclusive experiments conducted by its scientists Dr. Theobald Smith and Dr. Fred L. Kilborne in 1889 and 1890 established the fact that cattle tick infestation was necessary in the transmission of the disease. They thus showed irrefutably and for the first time that an infectious disease could be transmitted by an intermediate host or carrier from one animal to another. About that time Dr. Cooper Curtice, also of the Bureau of Animal Industry, made noteworthy contributions to knowledge of this subject by his studies and description of the life history of the cattle tick. This pioneer work opened a new field in medical science and pointed the way for studies that later solved the problems of the spread of such diseases as malaria, yellow fever, Rocky Mountain spotted fever, typhus, and others.

THE TICK-ERADICATION CAMPAIGN

There are in the United States two varieties of the cattle fever tick which are responsible for the spread of tick fever—the North American fever tick (*Boophilus annulatus*), which formerly infested most of the quarantined area, and the tropical variety of the same tick, *Boophilus annulatus* var. *microphus*, found in Florida, Puerto Rico, and areas adjacent to the Gulf coast. This tropical variety has frequently been taken from deer, and its ability to perpetuate itself on these wild animals has greatly complicated the eradication problem and delayed completion of tick eradication in some of the large swampy areas of Florida.

Without the tick the disease is of little importance and would probably die out. Recognition of this fact naturally led to investigation as to the feasibility of tick eradication, and this resulted in 1906 in the inauguration of a campaign to eliminate cattle ticks from the United States. This work, in which State officials, livestock owners, and the Bureau of Animal Industry have cooperated, has continued to the present time. When the cooperative project was undertaken, 985 counties in 15 Southern and Southwestern States were under Federal quarantine because of tick infestation (fig. 1). By December 15, 1940, the tick-eradication campaign had reduced this area to 2 quarantined counties in Florida, where the presence of tick-infested deer has delayed completion of the work, and to parts of 8 counties adjacent to the Rio Grande in Texas, where infestation continues to filter in on stray and smuggled animals from Mexico.

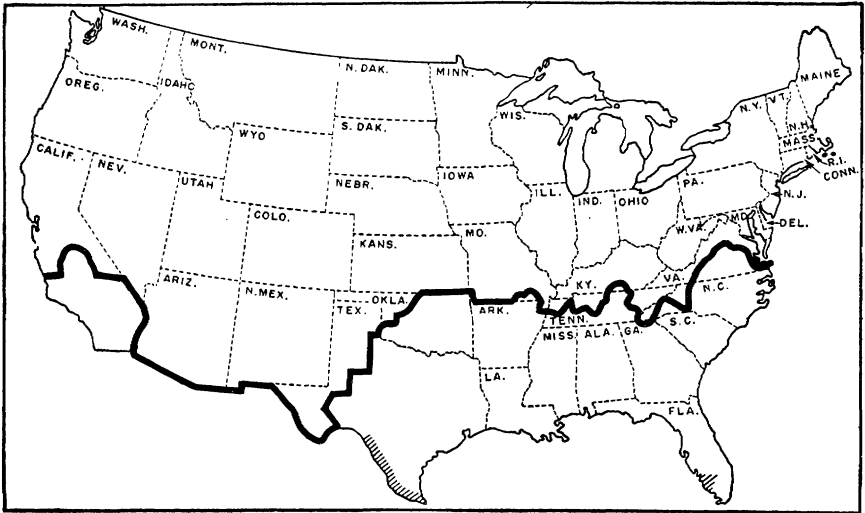


FIGURE 1.—The heavy black line shows the northern boundary of the tick-infested territory at the beginning of tick eradication in 1906. The shaded patches in Florida and Texas indicate the location of quarantined areas December 15, 1941.

Medicinal treatment of cattle sick with tick fever had usually been unsatisfactory, and it was generally believed in the United States that the disease and other losses chargeable to the tick could be satisfactorily and finally disposed of only by its complete elimination. Official work since 1906 has had that end in view. It was sometimes desirable, however, to ship well-bred cattle to infected districts in the South or to export them to tick-infested countries. These cattle, therefore, were immunized so that they could be introduced into the infected areas with comparatively little loss from the fever. Immunity was obtained by introducing the microparasite into the system by blood inoculation. It was found that young animals 6 to 15 months old best withstood this treatment and were more readily and completely immunized than older animals.

The eradication of the fever ticks is accomplished by killing them on the pastures and on the cattle. Pastures may be rendered tick-free by excluding all the host animals—cattle, horses, and mules—until all the ticks on the ground have died of starvation. The other and more common method is to let the cattle remain on the infested pastures and disinfect the animals at regular intervals, usually every 2 weeks, by dipping in an arsenical solution. This prevents the engorged female ticks from dropping to the ground alive and reinfesting the pastures. The seed ticks that are on the ground and those that hatch from eggs laid by females already there will get on the cattle from time to time and be destroyed by the dipping, while those that fail to find a host will starve to death. The length of time it will be necessary to continue the systematic dipping to insure eradication varies somewhat with the time of year the dipping starts and with the thoroughness of the work. The most satisfactory results have fol-

lowed when dipping began in March and was continued at 14-day intervals until November.

LOSSES DUE DIRECTLY TO CATTLE TICKS

The cattle fever tick is of great importance as the only natural agent by which cattle tick fever is transmitted from animal to animal, and eradication of the tick will result in eliminating the disease. But even if this were not the case, the damage done by the tick as an external parasite would more than justify the trouble and expense of the eradication effort.

The only food of the cattle fever tick is blood, and the loss of the blood it takes from cattle in its rapid development impoverishes the animals (fig. 2). Heavy infestation means that cattle must have more feed merely to meet the demands of the parasites; the growth of young animals is retarded, and they may remain thin, weak, and stunted (fig. 3, A). In dairy cows, the milk flow is greatly reduced.

Since May 1, 1928, the interstate shipment of tick-infested cattle for any purpose has been prohibited. This has necessitated the trouble and expense of dipping the cattle and freeing them of ticks before shipment. Formerly cattle coming from an infested district and sold in the



FIGURE 2.—A cow emaciated by heavy infestation with the cattle fever tick. This condition was once common in cattle throughout the South, but it is no longer seen in the United States.

“southern pens” at northern markets brought from $\frac{1}{2}$ to $1\frac{1}{2}$ cents a pound less than the quoted market prices. The cars used in shipping southern cattle had to be cleaned and disinfected, which added to the cost of transportation. The handicap placed on cattle raisers as a result of the decreased value of their stock averaged, at the figure quoted, from \$3 to \$9 a head, allowing an average weight of 600 pounds for all classes of cattle. This decreased value was re-



FIGURE 3.—A, A typical herd of ticky cattle; B, improved cattle in an area freed of ticks.

flected in the valuation of all cattle in the quarantined area, and the value of the infested ranges and pastures was also lowered, reducing the assets of the whole section. Tick infestation not only lessened the value of the live animals but caused their hides to be graded as of No. 4 quality. The same hide if free from ticks would grade No. 2, and the difference in price between these two grades is 3 to 5 cents a pound. Since a steer hide weighs about 42 pounds, the presence of ticks caused a loss in the hide alone of \$1.25 to \$2.10. The losses sustained by southern purchasers of northern purebred cattle with which to improve the native stock was another important item. About 10 percent of such cattle, even if immunized, would die of cattle tick fever, and 60 percent or more would succumb if they were not so treated.

THE GREATEST OF ALL CAMPAIGNS AGAINST PARASITES

The fight to eliminate the cattle fever tick from the United States is probably the most extensive and sustained attack ever made on any of man's parasitic enemies. It has resulted in freeing approximately 99 percent of the area formerly infested and has almost entirely eliminated the appalling losses once caused by the tick in the beef and dairy industries of the South. Death losses from tick fever have been practically eliminated. The last report of an outbreak of the disease was in August 1939. Special pens for southern cattle at northern market centers are a thing of the past; southern cattle now move to market or elsewhere without restrictions and compete on an equal basis with stock from other parts of the country (fig. 3, *B*). Purebred breeding animals for the improvement of native cattle may now be shipped to any part of the South without fear of loss from tick fever, and this has resulted in a marked improvement in recent years in the quality of southern cattle. The total cost to the cooperating State, county, and Federal Governments of eliminating this pest will amount to little more than the toll taken from the South in a single year by the cattle fever tick before eradication was undertaken.