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Bovine Leptospirosis

Dr. K. R. Reinhard*

BOVINE leptospirosis in the United States was first recognized in 1944 and has now been reported in a total of 11 states. The indications are that the disease is widespread and as more veterinarians become acquainted with the disease it probably will be shown to be present wherever large, shifting populations of cattle exist.

The diagnosis of bovine leptospirosis can be difficult; its manifestations vary from a peracute course with icterus, hemoglobinuria and sudden death to a scarcely perceptible disease characterized by slight chronic debility. When a large number of case histories are assembled and studied it becomes apparent that there can be no clearcut classification of the disease into clinical "forms" or types, for there is an intergradation in severity from the rapidly fatal cases to inapparent infections.

The accumulation of field reports and studies on experimental infections have yielded an understanding of the basic nature of bovine leptospirosis. Reduced to its simplest elements, the syndrome consists of at least the following phases:

1. Incubation period
2. Septicemia with febrile reaction
3. Hemolytic anemia
4. Interstitial nephritis

The duration of the incubation period, the time between inoculation with the agent and the stage of fever, is not known for natural infections but is thought to be about the same as that found in experimental infections; i.e., one to two weeks. After this period the febrile stage lasting from two to five days sets in and body temperatures may rise as high as 107°F. Hemolytic anemia begins during the period of incubation and often is well advanced at the time of fever. In most cases the anemia remits two to three weeks after infection. Interstitial nephritis is also well established at the time of septicemia and is the most persistent lesion, lasting as long as eight weeks.

Symptoms

These concepts of the fundamental nature of the disease make the variable clinical picture more understandable and less confusing. Following is a list of the more important signs of bovine leptospirosis: fever, hemoglobinuria, icterus, anorexia, depression, weight loss, abortion and decreased lactation (thickened milk).

The fever accompanies the stage of leptospiremia. The greatest amount of depression and anorexia occur at this time and diarrhea is a frequent concomitant sign. In cases observed by the author these signs remitted soon after the febrile stage.

Hemoglobinuria and icterus are caused by a rapidly-developing hemolytic anemia. The liver and spleen are natural routes of salvage and elimination of blood pigments,

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but when their facilities are overtaxed, excess free hemoglobin spills over into the urine and the degradation products may accumulate in the tissues and body fluids to produce icterus. The icterus therefore is of retention type, but this point is not fully explored for some liver necrosis does occur and in severe cases the icterus may be complicated by hepatic malfunction. The sudden deaths seen in bovine leptospirosis are probably due to the rapid reduction of red cells to the extent where there is insufficient oxygen transfer. It must be emphasized that hemoglobinuria and icterus are not constant signs of leptospirosis and actually have been found in the minority of the cases of the outbreaks studied thus far. Hemolytic anemia occurs to some degree in all cases, but hemoglobinuria and icterus are present only when a great amount of hemolysis occurs rapidly. In the author's experience, hemoglobinuria has been found to persist in some cases over a period of several days and to the extent of coloring the urine an opaque brownish black; while in other cases hemoglobinuria has been observed in but one micturition sample and with the presence of only a slight pink or cherry-red color.

Weight loss, which may be extreme in some cases, starts during the fever and may last as long as six weeks. There may be other signs of debility as well, such as a rough hair coat and decreased activity. The dehydration of fever, transitory anorexia, anemia and chronic interstitial nephritis all are debilitating factors and probably involved in the weight loss.

Abortion has been found in a number of the outbreaks studied. It is not known whether the Leptospira cause this directly or whether it is a result of physiological debility. However, Mathews has demonstrated argentophile filaments, presumably Leptospira, in the membranes of fetuses aborted during the course of the disease. This finding may indicate that the agent is directly involved in abortions.

A constant sign in lactating cattle is a marked drop in production with a thickened, yellowish or blood-tinged milk. There is no evidence to show that a true mastitis is present even though Leptospira have been cultured from the abnormal milk taken during the febrile stage. Little and other authors have emphasized that a flabby consistency of the udder is a constant sign. On the other hand, Tierney found that the udders were hardened in the leptospirosis cases he attended. It is probable that concurrent bacterial mastitis at times prevents the clear-cut demonstration of this sign.

**Nephritis**

The interstitial nephritis is not indicated very well by the physical signs, although it may contribute to the weight loss and prolonged convalescence. Occasionally it can be detected by testing the urine for the presence of coagulable protein. It is most definitely determined by slaughter, for it produces the picture of "white-spotted kidney." In the small number of cases which have been studied thoroughly by clinicopathological techniques, uremia has not been found to be a complicating factor. Further studies on severe cases are needed to substantiate this fact.

The interstitial nephritis is the most significant phase of the disease in relation to epidemiology and control. In some instances Leptospirae are given off in the urine during the stage of chronic interstitial nephritis. Leptospirae have been found in the kidneys and in the urine of animals as long as six or eight weeks after inoculation. Carrier animals evidently serve to spread the disease within and between herds. In all of the outbreaks with which the author is familiar, the occurrence of the disease was associated with assembly of a herd or a purchase of replacements through usual sales channels.

There are many important aspects of bovine leptospirosis such as therapy and control which are not discussed here for lack of space. However, the first step in control of a disease is its recognition by the veterinarian in the field in order that its incidence and importance can be assayed. An understanding of the basic nature of a disease, especially when the physical signs are highly variable, is the first step

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toward intelligent and accurate diagnosis. The concepts presented here will undoubtedly be modified or augmented by further research, but it is hoped that they will be of service to those who will have to deal with the syndrome of bovine leptospirosis.

References


Pregnancy Test

Two scientists on the staff of the University of Calcutta have found that, while the frog test for human pregnancy is not applicable to cows, in the limited number of tests which have been made, the injection of a solution of cow dung into a male frog or toad will cause a rapid release of spermatozoa if the dung is from a pregnant cow. They claim that the test detects pregnancy as early as the 55th day after conception.

In civil defense plans prepared in New Jersey, veterinary clinics and hospitals are designated as medical first-aid stations for periods of possible acute emergency.

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