12 June 2015
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Title: Aspects of immunity in bovine leptospirosis

Abstract:

Leptospirosis is a widespread disease, caused by infection with the spirochete bacterium *Leptospira*. Pathogenic *Leptospira* are classified into a number of different species and further subdivided, based on surface antigens, into serovars.

Leptospirosis in cattle is commonly caused by the cattle-adapted strain of serovar Hardjo, or occasionally by strains maintained by other animals which come in to contact with cattle. Hardjo infection is a well recognised disease worldwide and is endemic in the cattle population of the most European countries. Leptospires persist in the kidney and in the genital tract of both sexes. Infected cattle often remain chronic carriers for more that 12 months after infection and some may be carries for life.

Vaccine has been the major tools used in the control of leptospira infection in animals. However, the available vaccines are serovar specific and there is no cross-protection against the leptospiral serovars not included in the preparation. An understanding of the nature of immunity to *Leptospira* infection is fundamental to the provision of suitable diagnostic methods and vaccination scheme.

For a long time, protective immunity to Leptospira was thought to be entirely humoral. Antibodies to leptospiral serovar-specific lipopolysaccharide (LPS) molecules are able to transfer passive immunity between animals in some models of leptospirosis. Accordingly, traditional leptospiral vaccines were designed to induce the production of antibodies against LPS found on the surface of *Leptospires*. Several vaccines containing Hardjo serovar have been tested for the ability to stimulate a protective immune response, but despite stimulating strong antibody responses, none of the vaccine protected cattle from infection upon challenge. More studies showed that protective immunity in cattle against Hardjo using modern monovalent vaccine involves stimulation of Th1 cell mediated immunity, which can be characterized by activation and clonal expansion if IFN-γ positive γδ T-cell and CD4+ T cells. It was shown that this cell-mediated response was due to protein components of the bacterium and not due to mitogenic components such as LPS, but such protein component is still unknown. Identification of the Leptospiral protein involved in stimulating an IFN-γ response may shed light on essential leptospiral protein components required in effective vaccines.