LEPTOSPIROSIS: A NEW PERSPECTIVE ON AN OLD DISEASE

Jerry D. Olson, DVM, MS, DACT

Summary

Disease causing Leptospira can be placed in one of two broad categories for common domesticated mammals: They are either host-adapted or incidental strains. The four incidental serovars of *Leptospira* that are pathogenic to cattle are: *L. pomona*, *L. grippotyphosa*, *L. canicola* and *L. icterhemmorhagiae*. They are transmitted to cattle from other carrier animals that act as hosts for these strains. The strains are found in chronically infected rats, dogs, deer, or even pigs and are transmitted to cattle though urine-contaminated water. When the incidental strains of *Leptospira* are introduced into an unvaccinated, susceptible herd of cattle, they commonly cause an outbreak of abortions in the mid- to late-term pregnant cows. Commercial five-way Leptospiral vaccines are effective in preventing the abortion storms associated with the incidental strains of *Leptospira*, but ineffective to the most common serovar found in cattle (hardjo-bovis). Pfizer Animal Health recently received USDA approval to market the first effective *L. hardjo* vaccine, known as Spirovac®, in the United States.

(Key Words: Lepto hardjo, Health)

Background

The host-adapted strain for cattle in the United States is *Leptospira borgpetersenii* serovar hardjo (Type: hardjo-bovis), commonly referred to as *L. hardjo*. The primary source of *L. hardjo-bovis* for uninfected cattle is the urine of chronically infected cattle. Once cattle are infected, they may shed the organism in the urine for weeks or years. The primary manifestation of hardjo-bovis in cattle is a mild disease characterized primarily by low conception rates, but may cause embryonic deaths, abortions, and stillbirths.

The first report indicating that the current five-way leptospiral vaccines were ineffective in providing protection against infections from *L. hardjo* was published by Bolin in 1989. Bolin had three groups of experimental animals: 1) an unvaccinated control group, 2) a group of cows that was vaccinated once, and 3) a group of cows that was vaccinated twice. All three experimental groups of cattle were bred after control or treatment vaccinations, and at midgestation they were experimentally challenged with a virulent strain of *L. hardjo*. All control cows and 13 of 16 vaccinated cows became infected and shed *L. hardjo* in the urine. The percentage of urine specimens that contained *Leptospira* organisms was reduced in the experimental groups of vaccinated cattle compared to controls (79% vs. 11%, respectively). The calves from these cows were sacrificed after birth and *Leptospira* organisms were identified in the kidneys of 17 of 19 of the calves from control and vaccinated cows. The authors concluded the

[1]Pfizer Animal Health, 1808 Willow Springs Way, Fort Collins, Colo. 80528, e-mail: jerry.d.olson@pfizer.com.

current five-way vaccines failed to prevent renal-shedding of *L. hardjo* in the urine of the cows and failed to prevent fetal infection with the organism in the fetal kidneys.

In a later study Bolin demonstrated that vaccination with *L. hardjo* vaccine altered the serological response to the disease so the titers of *L. hardjo*-challenged cattle that were vaccinated were no different than that of non-challenged vaccinated cattle. Nonvaccinated cattle that were challenged with *L. hardjo* developed titers that were diagnostic of *L. hardjo* infections. The conclusion was that the vaccine not only provided little to no protection to cattle for the prevention of renal infection of dams or fetal infection, but it made serological diagnosis of *L. hardjo*, the traditional method for diagnosing the disease, impossible. The only positive factor about the existing vaccines with respect to *L. hardjo* is that they may reduce the duration of renal shedding in cows. It was not until state-supported diagnostic laboratories began to offer fluorescent antibody and PCR tests for identification of the organism in cattle urine in the late 1990s that disease diagnosis became practical.

Recent Findings

A recent survey was conducted to determine the incidence of *L. hardjo* infections in U.S. dairy herds. Eleven herds were selected in each of four regions of the country: Southeast, Midwest, Northwest, and West. Of the 44 herds in the survey, 57% were infected with *L. hardjo*, the most common form of *Leptospira* in dairy cattle. Within herds that were positive of *L. hardjo*, it is estimated that 30% of the cows were infected.

Low conception rates in dairy herds can be caused by numerous factors. When a dairy herd experiences low conception rates, *L. hardjo* should be considered in the differential diagnosis. Urine samples should be collected and sent to a diagnostic laboratory familiar with performing either the fluorescent antibody or PCR tests that allow identification of the organism in urine. Another characteristic observed in herds with endemic *L. hardjo* is a lower pregnancy rate in first-lactation cows in the majority of estrous cycles after the end of the voluntary waiting period when compared to second or greater lactating cows. Normally first lactation cows are more fertile and have greater pregnancy rates than older cows.

Pfizer Animal Health recently received USDA approval to market in the United States the first effective *L. hardj*o vaccine, known as Spirovac®. The vaccine has been available to dairy producers in other areas of the world for several years. Immunizing dairy animals consists of initial administration of two doses of vaccine 4 to 6 weeks apart, followed by annual vaccination. Some producers have chosen to vaccinate cows as they go through the dry period, whereas others have chosen to vaccinate the entire herd at one time. Initial reports from herds that have been diagnosed with *L. hardjo* and have been vaccinated look promising.