



Vet Call

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Immunization Strategies Part IV

Diseases With Vaccines Available

This month we end our series on immunology and the use of vaccines by continuing the discussion of specific disease with vaccines available.

■ Leptospirosis

This bacterial disease causes pregnancy wastage primarily in the last trimester. Leptospiral organisms cause infection in the kidneys and are excreted in urine. Leptospire survive in wet environments for up to 30 days. Infection of susceptible cattle occurs through mucous membranes and abraded or water-softened skin, or by sexual contact. There are more than 180 serovars of leptospira. Each serovar is adapted to a particular species of animal which it uses as a maintenance host. In the United States, serovar *hardjo* has a maintenance host relationship with cattle. A "maintenance host" relationship is characterized by high susceptibility to infection, easy transmission within the host species, relatively mild disease in its host, a tendency to cause long term rather than sudden disease and poor effectiveness of vaccination for prevention. Infertility may follow localization of leptospire in the uterus and oviduct of maintenance host *hardjo* carriers. Vaccination against *hardjo* infection in cattle does not appear to prevent kidney establishment, urinary shedding or fetal infection.

By contrast, an "incidental host" relationship is characterized by relatively low susceptibility to infection but a tendency to cause acute, severe disease. One also finds sporadic transmission within the incidental host species and good efficacy of vaccination for preventing infection. Serovar *pomona* is a common incidental pathogen of cattle and the maintenance host is swine. Leptospira strains maintained by non-domestic animals such as skunks, raccoons, opossums, foxes, beavers, mice and deer can infect cattle herds exposed to environments such as urine-contaminated waterholes.

An incomplete vaccination program

directed against leptospiral organisms may be more harmful than no program at all. Because of the relatively low effectiveness of *hardjo* vaccine, vaccination programs must be continuous to ensure that gaps in the herd's protection do not develop between vaccinations. The reintroduction of *hardjo* into a herd where vaccination has been discontinued or poorly applied might result in particularly severe outbreaks of clinical disease.

To establish immunity against the organism, primary immunization of heifers should consist of two or three vaccinations given at month intervals pre-breeding, and another booster in mid-gestation of the first pregnancy. Bacterins produce immunity of fairly short duration (at most, a few months) for controlling clinical disease. Because of these limitations, annual (preferably in mid-gestation) or twice annual (pre-breeding and mid-gestation) boosters should be given. Methods other than vaccinations for reducing risk of exposure to leptospirosis should also be implemented. These would include having a closed herd and fencing cattle away from water sources that can be contaminated by other herds, swine or non-domestic animals.

■ *Campylobacter fetus* (Vibriosis)

Campylobacter fetus ss venerealis is a disease passed during the act of mating. Infection of the uterus and oviducts persists for up to two months, but thereafter it's progressively eliminated. Management factors that minimize risk include utilizing artificial insemination (AI) with semen from noninfected bulls, utilizing bulls less than three years of age as they tend to be difficult to infect when exposed to the organism, treating or culling infected females and initiating an immunization program.

Protection of a herd from vibriosis by vaccination has proven to be effective and, in fact, vaccination can be used to cure as well as prevent infection in both males and females. Researchers in Australia first demonstrated that high doses of vaccine can clear the *Vibrio* carrier state. Producers should work with their veterinarians to

determine the dose of oil-adjuvanted vaccine that should be used. This vaccine-induced clearance of the carrier state is not typical for how vaccines work.

To induce an immune response to vibriosis, heifers should be vaccinated two or three times at one-month intervals after they are six months of age for the primary immunization. Annual boosters should be given 30 days prior to each breeding season if risk of exposure is present (if you have a closed herd, the risk is zero). Because of the curative ability of the vaccination, all bulls brought into a herd should be vaccinated a minimum of twice at monthly intervals with the last vaccination 30 days prior to the breeding season. If risk of exposure to carrier males or females is present, annual vaccinations should be used to booster immunity.

■ Anaplasmosis

Abortion following maternal infection with anaplasmosis is an indirect result of poor oxygen transport to the fetus. The organism is transmitted by blood-carrying vectors such as ticks, blood-sucking flies, mosquitoes and surgical instruments. Control of the disease is dependent on controlling blood-sucking insects, eliminating carrier animals from the herd by test and cull or by treatment with tetracycline antibiotics, and in some cases utilizing vaccines. Killed vaccines which provide a low level of resistance to anaplasmosis are available. Breeding females should receive primary vaccinations twice at not less than four-week intervals when they are open (bulls may be vaccinated any time). Animals in the herd should be given booster vaccines while open every two years thereafter. A vaccinated animal is still capable of becoming infected with anaplasmosis and becoming a carrier, but should be protected from symptoms including abortion. A reaction causing a calf to destroy his own red blood cells can occur in calves suckling cows vaccinated against anaplasmosis, so risk assessment should determine the benefits versus the risks involved.

■ **Hemophilus somnus**

Hemophilus somnus can cause male and female infertility and, only rarely, abortion. Transmission for the abortion syndrome is uncertain, but is most likely by mouth. Data showing the ability of vaccination to protect against abortion is lacking. Like all bacterins, protection from clinical disease is short-lived at best; therefore, a minimum of two primary vaccinations given at monthly intervals and at least annual boosters would be needed to provide even theoretical protection in those herds where the disease has been demonstrated.

■ **Trichomoniasis (Trich)**

Trichomoniasis is caused by a protozoa. The organism is passed from one animal to the other during the act of mating. In cows the parasite is confined to the reproductive tract. Trichomonades damage host tissue, cause inflammation of the uterus, and invade placental and fetal tissue, resulting in early embryonic death. After a variable period of infertility cows are usually able to clear the infection (although persistently

infected females have been reported). On subsequent exposure to infected bulls, cows appear to be less susceptible to infection.

Trichomoniasis does not have any symptoms in bulls. The organisms are located on the surfaces of the penis and penial sheath where they cause little damage. Most bulls less than four years of age appear to recover spontaneously or to be refractory to infection.

Control of trichomoniasis outbreaks involves management practices such as use of artificial insemination (AI), use of bulls less than four years of age only, culling females that do not conceive in a short breeding season, and continued surveillance of the herd by culturing bulls and culling carriers. Vaccination programs for females exposed to trichomonas-infected bulls appear to be beneficial in controlling outbreaks. The program should include two vaccinations four weeks apart for primary vaccination and annual boosters thereafter. Researchers have shown that, although an immunization program did not completely prevent trichomoniasis, it did decrease the number of cows infected and decreased the length of time it took for infected cows to clear the organism.

Preventing the introduction of trichomoniasis into a herd in areas where the disease is common includes eliminating

common pastures and identifying carriers by examination of samples taken from the penial sheath three times at weekly intervals before the start of the breeding season.

■ **Summary**

Protection from pregnancy wastage in beef cattle has been enhanced by the development and improvement of vaccines. In order to obtain benefit from these vaccines, their use must follow the principles of immunology and they must be combined with sound management practices that control risk. Because of the limited number of diseases for which vaccines are available and the inability of vaccines to provide immunity in the presence of nutritional deficiencies, immuno-suppression, concurrent disease and other management shortfalls, vaccination programs should not be the cornerstone for a herd health program but rather a part of a sound management program.



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