Bovine Trichomoniasis:

Understanding this Tricky Profit Taker!

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Bovine Trichomoniasis or 'Trich' has been gathering a lot of attention by Texas ranchers recently. *Tritrichomonas foetus* is an important reproductive disease of beef cattle. The increasing awareness of this pathogen's impact has led all western states except Texas and Kansas to introduce regulations regarding the movement of bulls both within and in between states. This month, the Texas Animal Health Commission will finalize regulations as recommended by the TAHC's Trichomoniasis Working Group. Of significant concern to a lot of folks in the cattle industry is the variation in understanding and awareness of this disease. In our clinical practice at the Texas A&M College of Veterinary Medicine and Biomedical Sciences we have seen several instances where this misunderstanding has actually worsened the problem of Trich on the ranch. In this article, I will attempt to help clarify some of these areas.

Trichomonads are unicellular protozoa that have a global distribution in livestock, poultry, companion animals, and people. The pear shaped organisms are similar in size to white blood cells and also bovine sperm cells. Though Bovine Trichomoniasis is not a zoonotic disease (can't be spread to people), it is worth mentioning that the human version of the disease is also devastating. The first report of a venereal trichomonad (in humans) was described in 1837. This organism later became known as *Trichomonas vaginalis*. *T. vaginalis* is the number one, non-viral sexually transmitted disease (STD) that affects more than 250 million people worldwide and causes an estimated 7.4 million cases in the United States. The bovine trichomonad, *Trichomonas foetus* was first reported in the United States in 1932.

Understanding the Disease:

The bull is the long term carrier of the organism without ill effects or visible lesions. As a bull matures, the epithelial crypts of the glans penis and the distal prepuce deepen to allow the *T. foetus* organism to establish a long term infection. With reservation, I will mention that self clearance of an infected bull with sexual rest is reported in the literature. That said, I have not observed this in practice and therefore would ***never*** rely upon this approach as a management strategy in dealing with an outbreak. A recent outbreak investigation in one of our client's herds revealed 25% of bulls infected (both culture + and PCR +). One of the bulls, a valuable 4 y.o. Angus bull was kept on the ranch with sexual rest for nearly a year. At that time, he was culture negative yet remained PCR positive. In other instances, I have tested an entire bull battery with only the PCR test and ultimately did not find all of the positives on the first round of testing. This illustrates the point that, though veterinarians are dealing with the best test we have available, we know that it is not 100% effective at detecting an infected bull. Working with your veterinarian to determine your herd's risk factors and potential for infection will help determine the timing, type and number of tests to be performed.

In female cattle, the organism is introduced following breeding and initiates the infection. An early symptom of the presence of *T. foetus* is a vaginitis. Shortly after, the organism reaches the uterus causing a metritis to develop. Though the organism is introduced at the time of breeding, conception or pregnancy is generally not impaired. Fetal death occurs roughly 2 months after pregnancy. This gives rise to the

extended time period between observed heats. In a small percentage of the infected cattle, a uterine infection or pyometra develops. This infection can be detected by your veterinarian via rectal palpation or ultrasound and confirmed with a testing procedure similar to that of the bulls. Though not a certainty, spontaneous clearance of the infection in female cattle over a few months in female cattle has been reported but certainly cannot be relied upon to clear a herd of the disease. It should be pointed out that in a low percentage of the cow population persistent infection (cow carries the infection through pregnancy into the next breeding and re-infects the bulls) has been documented. Though the estimated frequency is low (<1%), it requires consideration of the female carrier state for control programs when Trich is diagnosed in the herd.

Economics

A key factor in the profitability of the cow-calf operation is weaning a high percentage of uniform healthy, heavy calves while keeping inputs reduced to an acceptable level. According to University of Florida's Dr. Owen Rae, net income from the cow-calf operation can be defined as:

[(# of calves weaned X weight of calves weaned) X price per pound] – maintenance cost per cow/calf

Bovine trichomoniasis affects most if not all components of the equation. Reduced pregnancy rates and the variable distribution of the live born calves over the calving period are the most obvious. The increased testing, culling, and prevention costs decrease the overall net per exposed female. The impact to the cow-calf producer's profitability based on simulated models was significant. Dr. Rae's disease model predicted a reduction of 14 to 50% in annual calf crop, a prolonged breeding season, a reduction of 5 to 12% in the suckling/growing period, a reduction of 4 to 10% in pounds of marketable calf crop at weaning, a reduction of 4 to 10% in monetary return per calf born, and a substantial reduction of 5 to 35% in the return per cow confined with a fertile bull. Prevalence in this model varied from 20-40% (1 to 2 infected bulls out of 5 total breeding bulls). Income from calves sold was reduced by $24,551.00. This was strictly related to decreased number of calves as a result of trichomoniasis in the herd. This value does not include losses for culled cows, bulls, testing and prevention (vaccination) strategies. When those additional factors are included, the financial impact is even more significant. In 2001, Drs. Wikse and McGrann from Texas A&M University summarized the economic impact of an actual *T. foetus* outbreak in Texas. This particular herd of 161 commercial cows had a reduction in pregnancy rates of 27% from 2000 (92%) to 2001 (65%) in the first year of the outbreak. First year losses related to reduced calf crop, culled bulls and open females, purchased replacement bulls and females, and prevention costs exceeded $78,000. Projections for the 3 year period (including year 1) for ongoing losses to this ranch exceeded $100,000. A key difference between Dr. Rae's model and this outbreak was the bull to cow ratio. The Rae model was based on 20-40% prevalence in 5 bulls servicing 200 cows (1:40 male: female ratio). The herd in Texas had a lower ratio (1:26.8). In other words, the incidence of *T. foetus* in cows is influenced by the management of breeding bulls. The use of excessive numbers of bulls, i.e. over mating, favors a higher incidence of infection in cows due to multiple services at estrus (heat).

Treatment:

There are no legally available drugs to treat affected cattle in the United States.

Sample Collection / Diagnosis / Testing:

Over the years, various methods of sample collection have been performed by veterinarians. Currently, most veterinarians rely on preputial scrapings as the collection method of choice. Once the sample is collected, it is then inoculated into the culture and transport media (In Pouch TF). The quality of the sample is highly dependent on the skill and experience of the collector. The sensitivity of the test is affected by the field conditions (i.e. low number of organisms collected when sampled) and handling conditions (i.e. temperature and transit time to laboratory). Fortunately, the sensitivity has increased with the universal acceptance of the DNA – based the polymerase chain reaction (PCR) test. Though, the sensitivity of the available tests vary (influenced by collection techniques, field conditions and sample handling), they are reported in a range from 75% to 93% depending on the number and type of tests performed. Samples can be tested by culture, PCR or both. Once a diagnosis is made by culture, the sample is also tested by PCR to verify that the observed organisms are indeed the venereal *T. foetus* and not the intestinal forms of Trich. It is documented that that the intestinal forms of Trich can be found in the prepuces of bulls (virgin and non-virgin) and that these species can be transmitted to cattle at breeding. Current evidence suggests that infections by these enteric forms are likely transient and non-pathogenic.

Risk Factors / Control / Prevention

Once the diagnosis of trichomoniasis is made in a beef herd, the identification of carrier status of bulls begins. Culling older bulls is often suggested. Older bulls have deeper crypts in the epithelium of the glans penis and prepuce. It is a common misconception that young bulls cannot get infected with Trich. **This is simply not true.** Though younger bulls (i.e. those <3 y.o.) are not as likely to be chronic carriers, they can and do mechanically transmit *T. foetus* from female to female. An Australian study in 1976 demonstrated the ability of a known Trich infected 3 y.o. Hereford bull to infect 19 of 20 virgin Hereford heifers after a single service over a 2 week period.

Ranches that practice high levels of biosecurity, keep excellent records, and monitor reproduction rates are not as likely to be severely impacted by bovine trichomoniasis. Further, highest calving incidence is achieved when all bulls are tested for *T. foetus* before the breeding season and all bulls with positive culture results are culled.

In 1947, a leading expert on Bovine Trichomoniasis, Dr. Bartlett, proposed two basic principles of control of trichomoniasis in cattle: 1) keep from breeding susceptible cows to infected bulls, and 2) keep from breeding susceptible bulls to infected cows. Knowing the status of all bulls pre- and post-breeding is still the best form of herd surveillance. Verification of pregnancy rates after breeding is another key to ensuring the herd is not affected by a venereal pathogen like *T. foetus*. The following list of management techniques will reduce the potential impact of bovine trichomoniasis in a cattle herd:

1. Biosecurity: Keep fences in good repair and make note of any contact with breeding stock from neighboring herds.

2. Breeding season: Shortened breeding season (i.e. 90 day) should be used. If the breeding season is extended or year-round, the disease will be more difficult to control and to identify animals carrying the organism.

3. Replace older bulls with younger virgin bulls, keeping the average bull age as young as possible.

4. Culture all bulls 3-4 weeks prior to breeding season (along with a properly performed BSE) and 2-3 weeks after breeding season.

5. Palpate cattle after breeding season.

6. Cull or separate open cows at pregnancy check time as well as those that abort or have a noticeable discharge. Check the aborted fetus and any discharge for *T. foetus*.

7. Purchase only virgin replacement females from known, reputable sources.

8. Vaccinate: A commercial vaccine (Trich Guard – Fort Dodge) containing inactivated *T.foetus* is available for use in a control program. A 1992 study showed an increase in pregnancy rates from 31% to 63% in an infected herd. A key point when using the vaccine is to FOLLOW THE LABEL. Initially, 2 doses are required, each given 2-4 weeks apart, 30 days prior to the breeding season. The timing of administration and number of doses administered are critical to proper timing of immunity and exposure. Also, control other reproductive disease like campylobacteriosis (vibriosis), brucellosis, IBR, and BVD with an appropriate vaccination program. A commercially available killed vaccine is available.

9. Artificial insemination can reduce the spread of bovine trichomoniasis.

Conclusion

Trichomoniasis can have significant impacts in the reproductive performance of a beef cattle operation. An awareness of the impact that the carrier animals can have on a beef operation is the first step to developing a sound *T. foetus* control / prevention program. When biosecurity, surveillance, herd health, and record keeping come together in a well managed system, the beef cattle rancher can feel rest assured that the silent profit taker is not at work on their ranch.