

Trichomoniasis: Pathogenesis, Epidemiology and Economic Aspects

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Trichomoniasis is a venereal disease of cattle caused by *Tritrichomonas fetus* (*T. fetus*). Its clinical signs are repeat breeding at both regular and irregular intervals, abortion and pyometra (1,2,5,9). These are readily observed in dairy cattle. However, in beef cattle on western ranges, the first indication of a problem is usually finding additional cows open or with pyometra at the time of pregnancy check. Data is limited on the incidence of trichomoniasis (3,8,14). A 7.3% infection rate has been reported in slaughtered bulls in Florida (3). Another study in Oklahoma reported a 7.8% infection rate in bulls presented for sale at auction (14). These infection rates reflect only selected populations of bulls within these areas. Primary infection rates of over 40% have been reported in cow herds in Australia. In Colorado, identification of trichomoniasis in herds was 22 of 155 herds in 1987, 22 of 210 herds in 1988, and only 6 of 140 herds tested before October in 1989. The objective of this presentation is to review the pathogenesis, epidemiology, and economic aspects of the disease.

Pathogenesis

The pathogenesis of trichomoniasis has been well documented (1,2,5-13). The following is offered only in summary. Bulls are the primary vectors of trichomoniasis. The organism is harbored in the epithelial crypts of the penis and prepuce as surface contaminants. Consequently, it presumably does not evoke an immune response in bulls. Because these crypts do not develop until after the bull is about four years of age, younger bulls usually do not become permanent carriers (4). However, young bulls can serve as mechanical vectors for the disease if a noninfected cow is bred within 20 minutes of breeding an infected cow (10). The detrimental aspects of trichomoniasis are manifested in the cow. Transmission of the disease is not 100% although rates of transmission experimentally have been close to 100%. Clark et al. reported only a 42% infection rate in cows bred to an infected bull during the active breeding season (6).

In cows, *T. fetus* is associated with a vaginitis, cervicitis, endometritis, and a placentitis. This may result in a transient period of infertility, abortion, pyometra, or a cow harboring the organism through gestation to serve as a source of infection the next year. Some cows may be ren-

dered infertile due to the damage of the disease. Primary infection is associated with about a 90-day delay in conception while secondary infections with about a 20-day loss in conception (6). Cows are susceptible to reinfection after a short period of immunity. Reinfection rates of 0%, 56.3%, 72.2%, 75% and 100% were reported when the period of freedom from infection was 1, 9.2, 10.3, 13.2 or 19.7 months respectively (6). It is doubtful if immunity lasts beyond 15 months in any circumstance. In fact, delays in conception of beyond 15 months resulted in delays in conception equal to the primary infection.

Epidemiology

Numerous reports on the epidemiological aspects of trichomoniasis have been written (1,2,4-13). In addition, clinical impressions from dealing with infected vs noninfected herds provide some factors that contribute to the occurrence of trichomoniasis. These can be divided into bull, cow and management factors. It is the interaction of these factors that determine the severity of infection within the herd and the economic damage. Bull factors can be summarized to be age of bulls, number of bulls, number of infected bulls, length of breeding season, mating ability, and libido. Cow factors would be age, nutritional state, period from last calving, immunity status, and length of breeding season. Management factors that interact heavily are pasture management practices, acquisition of new bulls, length of breeding season, nutritional management of the herd, replacement strategies, and others including fence upkeep. Some common entities that fit with trichomoniasis problems in Colorado are purchasing used or using leased bulls, cooperative grazing, introduction of mature cow replacements, long breeding season, and failure to look beyond the impact of nutrition.

Economic Aspects

Limited information is available on the economic aspects of trichomoniasis. A recent report estimated that losses due to trichomoniasis in the state of Oklahoma alone approached 5 to 7 million dollars annually (14). This was extrapolated to the cow population from a slaughter house study of bulls. The accuracy of this extrapolation is questionable.

No information is available on the economic losses on a herd basis. Herd economic losses results from a reduction in calving rates, lower weaning weights of calves due to delayed conception, and higher culling rates. The author is aware of only one study that actually compared production losses with noninfected and infected herds under the same management (6). Losses in calves due to trichomoniasis were reported each year of the study due to both a decrease in calving rate and delayed conception in the infected herds. An 18% reduction in calving rate was reported with an average delay in conception of 40 days in the infected herd. Using this information and making some assumptions regarding weaning, marketing and average daily gain of the calf, we end up with an \$85.00 more return per cow on a herd of cows if we keep the herd uninfected (Table 1). Assumptions are all calves born survived to weaning, all open cows are culled, and an average daily gain of 1.75 pounds for the calves. Prices were assumed to be \$90.00/cwt for steers, \$85.00/cwt for heifers in the non-infected herd and \$96.00/cwt for steers and \$91.00/cwt for heifers in the infected herd due to lighter weaning weights. Cull cow prices were assumed to be \$45.00/cwt.

Table 1. Estimated return per cow from a non-infected and Trichomoniasis infected herd of 100 cows

Source of Income	Dollars Return Per Cow					
	Non-Infected Herd			Infected herd		
	N	Wt.	\$	N	Wt.	\$
Steer Calves	46	500	207	37	430	153
Heifer Calves	38	470	152	11	400	40
Cull Cows	8	1000	36	26	1000	117
Total Dollar Return per cow			395			310

Prevention and Control

The maintenance of closed herds with the introduction of only virgin bulls and cows would be an ideal way to prevent trichomoniasis. This is not always possible. Practical prevention and control can usually be achieved by using only 3-year-old or younger bulls for breeding. This method of control is effective because young bulls are not as likely as old ones to become permanent carriers. In many beef operations, however, some older bulls are used. In these herds, all bulls over 4 years-of-age should be routinely tested for trichomoniasis as a part of the breeding sound-

ness exam. The status of the herd would thus be monitored to detect either infection or reinfection.

Culling of open beef cows at the time of pregnancy tests also effectively reduces a primary source of infection. Thereafter, cattle that abort prior to calving should be culled. For commercial cattlemen these recommendations are generally accepted because maintenance of a nonproductive cow is costly. Unfortunately, the culled cattle are often sold through auctions, and serve as a source of infection for other livestock producers. Because of this problem it has been advocated that trichomoniasis become a reportable disease. Some states have made it reportable disease. In Colorado, for example, infected bulls can only be sold to slaughter and cannot be sold into other herds.

For those ranches involved with grazing associations and/or using leased bulls control requires much more vigorous efforts. Rules need to be established at the grazing level based on the epidemiology and pathogenesis of the disease. For those using leased bulls, vigorous testing of the bulls between breeding herds should be practiced. Relying only on one negative test between breeding herds may be opening the door for introduction of the disease. Two or more negative weekly tests, 30-60 days prior to the breeding season is recommended. This measure should be combined with strict culling of open cows.

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