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Review Article
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# *Tritrichomonas foetus* in Beef Bulls

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## Abstract

*Tritrichomonas foetus* is a production and regulatory concern for beef producers in the Western United States and more recently in states of the Mississippi Valley. Traditionally preputial scrapings have been collected, cultured in enriched media, and examined microscopically. PCR techniques are now being used extensively to confirm culture results or as a stand-alone test for the organism. This technology offers the advantage of distinguishing the pathogenic *Tritrichomonas foetus* organism from other nonpathogenic fecal organisms.

**Keywords:** *Tritrichomonas foetus*; PCR; Culture

## Introduction

*Tritrichomonas foetus* (*T. foetus*) is a single cell parasite associated with venereal disease in cattle. The organism produces abortion, infertility, prolonged calving intervals, and pyometra in infected cows. The organism infects the prepuce of the bull and is transmitted to susceptible females during coitus [1,2]. Most often the female will be only transiently infected, and in a matter of 4 to 5 months the infection is cleared and she is again reproductively sound, yet remains susceptible to re-infection at a later time. There are reported cases where the infection was present for longer periods, and isolated incidences in which the female remained infected after delivering a normal term calf. Although infection in young bulls reportedly may clear, current state regulations result in mandatory slaughter of infected bulls. With the exception of one, all states west of a line drawn north to south through the eastern border of Kansas have some form of *T. foetus* regulation, and recently states east of that line have developed regulations addressing *T. foetus* including Missouri, Arkansas and Louisiana. All regulatory efforts address suitable testing to determine the presence of infection in bulls. Diagnosis of infection in the female and the movement of infected females is not significantly controlled or monitored. Diagnosis of *T. foetus* is based on clinical signs, history, and laboratory detection of the organism. In order to confirm a herd is infected with *T. foetus* it is necessary to demonstrate the organism or it's DNA. This can be done by direct microscopic examination, culture followed by microscopic examination and/or PCR of Preputial Scrapings (PPS) or cervical mucus [3-7].

## Methods to Detect

Culture is limited by the inherent lack of environmental stability of the organism, collections made or maintained at low temperatures, exposed to direct sunlight, bacterial and fungal contamination of culture media, and changes in pH may cause a loss of viability and result in failure to detect the organism. Additionally as the organism dies in the culture media it degrades and the by-products of the degradation results in a breakdown of the organisms DNA [8,9].

Potential sample degradation supports an early commitment to doing PCR is essential and that waiting until the end of the traditional culture period may result in an inadequate amount of DNA for diagnostic purposes. A second disadvantage to culture is that there are few individuals capable of distinguishing the morphologically nuances between *T. foetus* and other Trichomonad spp., therefore most final diagnoses require a confirmation through the use of PCR.

## PCR and qPCR

With the reported high analytical sensitivity of PCR, a move to using PCR as a stand-alone test has been seen with many state regulations relying on PCR in lieu of culture [10-14]. However, PCR is costly and may result in false positives. Two types of DNA studies are being employed, gel based PCR and qPCR. Both methods require the extraction of the *T. foetus* DNA from the collected sample. The basic difference between the two methods is in how the DNA is detected after extraction and the PCR has occurred. Gel based PCR relies on detecting a band at the appropriate base pair level versus qPCR that uses a fluorescent probe, optical density, and cycle threshold (Ct) to detect the presence of the organisms DNA with the Ct being the determining factor on a sample being called positive or negative. From the producer's standpoint PCR is an expensive alternative to traditional culture. A method to lower the cost of using PCR is to pool samples. A published study using a pooled PCR strategy with culture as the criteria showed an increase of diagnostic sensitivity to detect the organism over culture existed, and that the increased diagnostic sensitivity could be accomplished without a significant increase in the price of diagnostic testing [7,15-17]. However further study is required before any conclusion can be drawn.

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