

# CATTLE GUT MICROBE SERIES:

## TRUEPERELLA PYOGENES

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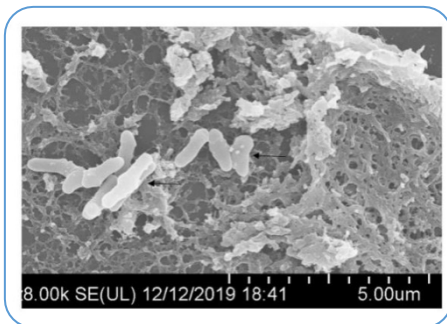


## Cattle Gut Microbe Series

The ruminant is a fascinating animal because of its ability to convert feed and forage into energy and microbial protein. This action is due to the animal's gut microbes, including **bacteria, protozoa, fungi, and archaea**. The microbes of the rumen and lower gut have a large impact on the performance and health of their host animal. Many of these microbes are beneficial to cattle. However, other microbes may cause harm. Optimizing management strategies to improve performance and animal health relies on an understanding of these key microbes in the digestive tract and how they may impact your operation. This publication in the Cattle Gut Microbes Series will introduce and discuss microbes, or groups of microbes, that are important to cattle production.

## Overview & Description

*Trueperella pyogenes* (*T. pyogenes*; formerly known as *Actinomyces pyogenes* and *Arcanobacterium pyogenes*) is a rod-shaped, **gram-positive, facultative anaerobe**. *T. pyogenes* is found in the rumen, but can also be identified acting as a pathogen in the liver, reproductive tract, and abscesses in cattle.

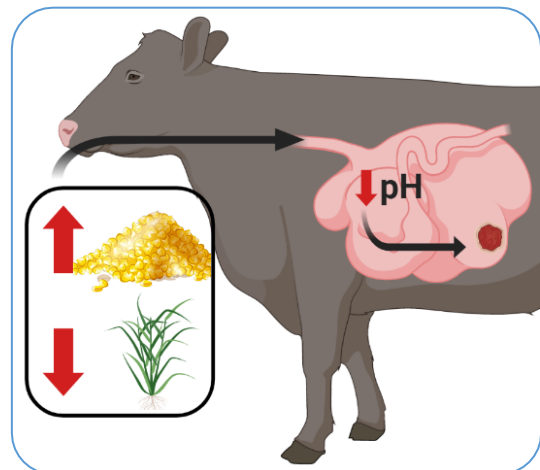


*T. pyogenes* is a facultative anaerobe, which means it prefers to live in the presence of oxygen, but can survive without it. *T. pyogenes* is more commonly found on the rumen wall of healthy cattle than in the rumen content due to the low oxygen concentration diffusing from the ruminal wall blood vessels.

Figure 1. Scanning electron microscope image of *T. pyogenes*. Image courtesy of Liu et al, 2024. (<https://doi.org/10.3390/ijms25073974>)

Diets low in forage content and high in grains can disrupt the microbial communities in the rumen. As grains are rapidly fermented by microbes, a ruminal increase in acid and a drop in pH occur. The increased acidity of the rumen environment can damage the rumen wall causing lesions. These lesions allow *T. pyogenes* to escape the rumen and become pathogenic in other organs.

Figure 2. Low forage and high grain consumption disrupts rumen pH resulting in rumen wall damage. Image created using BioRender.



### DID YOU KNOW?

- **Bacteria** are microscopic, prokaryotic living organisms that have only one cell. **Protozoa** are single-celled eukaryotic organisms. Fungi are eukaryotic organisms that include microorganisms such as yeasts and molds. **Archaea** can include methanogens, which are microorganisms that can produce methane.
- **Gram-positive** bacteria are a type of bacteria that have a thick cell wall. In a Gram stain test, these organisms yield a positive result. **Facultative anaerobes** are able to grow either with or without the presence of oxygen.

*T. pyogenes* is the second most common pathogen identified with causing liver abscesses in cattle. As *T. pyogenes* escapes through rumen wall lesions, it enters circulation and travels to the liver. It has also been found to act synergistically with *Fusobacterium necrophorum*, another common liver abscess causing pathogen [1].

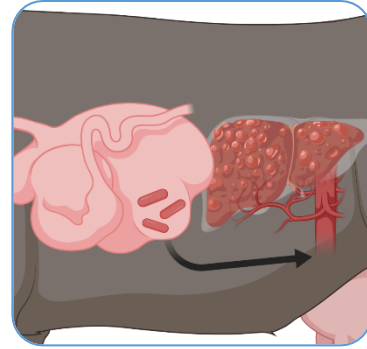
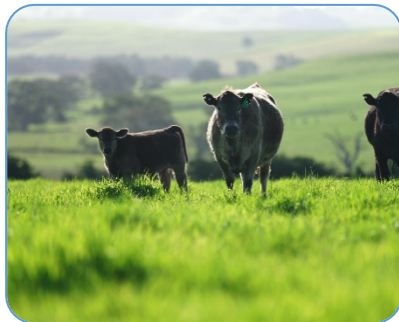


Figure 3. *T. pyogenes* escapes the rumen, enters blood circulation, and ends up in the liver resulting in abscesses. Image created using BioRender.



*T. pyogenes* can also be found in the reproductive tract, where it has the potential to become pathogenic. *T. pyogenes* is often isolated from postpartum uterine infections, such as **endometritis** or **metritis**, which can result in reduced reproductive performance [2].

Figure 4. Cattle on pasture. Image courtesy of UTBeef.com.

## What does this mean for me?

Although *Trueperella pyogenes* is present in a healthy rumen environment, it is commonly known to become pathogenic in other organs, or by causing abscesses in the liver and postpartum diseases in the uterus. These complications can result in consequences such as [1]:


- Reduced feed intake and daily gains
- Poor carcass quality
- Poor reproductive performance

Understanding how these bacteria influence cattle can help beef cattle producers provide optimal nutrition for maintaining animal health and optimal production in their herds. More specifically, maintaining a proper rumen pH is crucial, and can be achieved through feeding management and ensuring that the diet contains adequate fiber.

If you have any further questions about microbes in your cattle operation, please contact Phillip Myer or visit [rumenmicrobes.utk.edu](http://rumenmicrobes.utk.edu). As always, consult with your county UT Extension agent or your veterinarian for more information.

### References

1. Nagaraja, T. G., and K. F. Lechtenberg. 2007. Liver Abscesses in Feedlot Cattle. *Veterinary Clinics of North America: Food Animal Practice* 23(2):351-369. doi: 10.1016/j.cvfa.2007.05.002
2. Wagener, K., T. Grunert, I. Prunner, M. Ehling-Schulz, and M. Drillich. 2014. Dynamics of uterine infections with *Escherichia coli*, *Streptococcus uberis* and *Trueperella pyogenes* in post-partum dairy cows and their association with clinical endometritis. *The Veterinary Journal* 202(3):527-532. doi: 10.1016/j.tvjl.2014.08.023

 **DID YOU KNOW?**

**Metritis** (inflammation of the uterus) is a bacterial infection and refers to the whole uterus, while **endometritis** is limited to the lining of the uterus (endometrium).



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