Reducing the Negative Impact of Pathogenic *Salmonella typhimurium* in Weaned Holstein Steers

**Introduction**

*Salmonella* is a costly disease for both beef and dairy producers resulting in economic losses associated with treatment costs, reduced growth rates, poor milk production, increased susceptibility to other opportunistic diseases and mortality in adult cows and calves.

Clinical signs of *Salmonella* infections in adult cows and calves can vary depending on type of cattle, strain of *Salmonella*, infectious dose, potential stressors and immune status of the animal.\(^1,2\) Symptoms of salmonellosis in cattle can include fever, difficulty in breathing, diarrhea, performance losses, respiratory syndromes, abortion and sudden death.\(^1,3,4\)

**Materials and Methods**

Research in collaboration with U.S. Department of Agriculture (USDA scientists) at the Livestock Issues Research Unit in Lubbock, TX, evaluated the potential for CLOSTAT\(^5\), a patented *Bacillus subtilis* active microbial, to reduce the severity of salmonellosis in weaned Holstein steers challenged with *Salmonella typhimurium*.\(^5\) Calves were fed either control diets (no CLOSTAT) or 13 g/h/d CLOSTAT in a starter ration for 35 days. Calves were then assigned to 1 of 4 treatments, consisting of CLOSTAT or no CLOSTAT (control) and *Salmonella* (1.6 x 10\(^6\) *Salmonella typhimurium*) or no *Salmonella*.

**Results and Discussion**

The CLOSTAT calves displayed decreased rectal temperatures (P< 0.001) after the challenge compared to the control calves challenged with *Salmonella* (Figure 1). Mounting an immune response to a pathogen challenge requires a significant amount of energy. It has been estimated that an increase in core body temperature by 1°C requires an increase of 10 to 13% in an animal’s metabolic rate.\(^6\) Mediating this change in body temperature would potentially spare glucose, allowing energy to be put towards other productive functions.

Additionally, calves consuming CLOSTAT had significantly reduced *Salmonella* concentrations (P< 0.03) in the jejunum, ileum and transverse colon 48 h (Figure 2) after the challenge. These calves also had numerically reduced *Salmonella* concentrations in all tissues 96 h (Figure 3) post-challenge, compared to control calves challenged with *Salmonella typhimurium*. 
**Figure 1.** Effect of *Salmonella* challenge on rectal temperature of Holstein steers$^5$

**Figure 2.** *Salmonella* concentrations in tissues 48 hours after challenge$^5$

* Colony Forming Units
Conclusions
Reducing the intestinal pathogen load in calves exposed to *Salmonella* can alleviate energy demands on the immune system by mitigating the rise in body temperature. Additionally, reducing *Salmonella* concentrations in the intestine may reduce the disease challenge, diminishing the potential for clinical outbreaks of *Salmonella* in beef cows and calves.

References
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