# Research Notes

Arm & Hammer Animal and Food Production

## CELMANAX helped reduce STEC shedding and associated symptoms in calves.

### STUDY OVERVIEW

A study[1] was conducted to evaluate the influence of CELMANAX™ and a probiotic application on the loss associated with Shiga toxin-producing *E. coli* (STEC) mediated hemorrhagic enteritis (HE) disease outbreaks in calves. This was evaluated across three dairy production sites in Alberta, Canada, during the winter months of 2009 – 2011, where infections regularly resulted in morbidity and mortality losses between 50% and 80%.

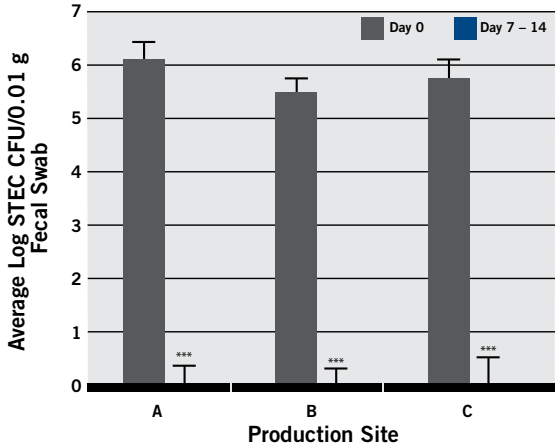
Postmortems were performed on control calves (non-HE) and eight calves dead due to HE from three production sites using standard procedures. The digesta, jejunum and colon tissue were evaluated for STECs. Feed components and jejunum tissue were also examined for mycotoxigenic fungi and mycotoxin content.

- Between 5 – 10 calves per production site were symptomatic and received CELMANAX Liquid prebiotic at a rate of 7 g/head/day combined with Dairyman's Choice™ calf starter probiotic at a rate of 7 g/head/day for 7 – 14 days.
- Fecal STEC shedding was monitored before and after the treatment.

### RESULTS

- All HE calves had high levels of STEC colonization of the small intestine.
- The CELMANAX/Dairyman's Choice application was 100% effective in eliminating symptoms in calves in 7 to 14 days (Fig. 1, *P*=0.001).
- 100% of the calf ration samples (n=3 per site) at all three calf sites were positive for four or more fungi. Aflatoxin and Fumonisin were measured in the digesta and hemorrhaged jejunal mucosa of dairy calves (Table 1).

**FIGURE 1:** Effect of CELMANAX/Dairyman's Choice applications on STEC shedding in calves.




(n=3; ***$P$=0.001)

**TABLE 1** Average concentration (ppb) of fumonisin and aflatoxin measured in the hemorrhaged jejunal mucosa of dairy calves using an ELISA-based method.

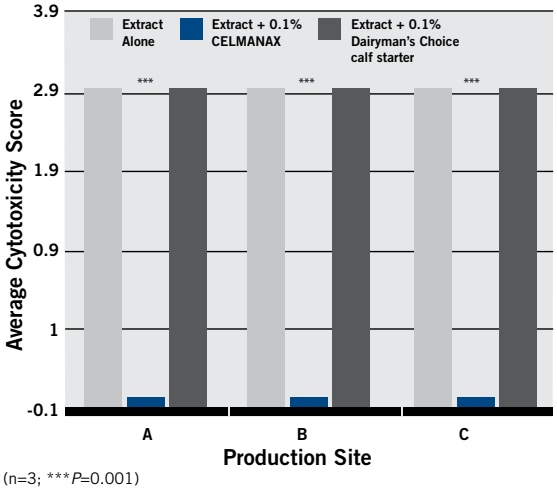
| Dairy production site | Average Mycotoxin Content (Mean ± SE) | |
|---|---|---|
| | Aflatoxin (ppb) | Fumonisin (ppb) |
| A (n=2) | 3 ± 0 | 50 ± 0 |
| B (n=2) | 1 ± 0 | 350 ± 0 |
| C (n=2) | 2 ± 0 | 250 ± 0 |
| Control (n=3) | 0 ± 0 | 0 ± 0 |

- For all production sites, extracts from the calf rations were taken to evaluate the toxicity to bovine colonic cells. CELMANAX™ was 100% effective in preventing the cytotoxicity *in vitro* (Fig. 2, *P*=0.001) compared with the Dairyman's Choice™ calf starter, which had no effect.

## CONCLUSIONS

- Combination of mycotoxin exposure and colonization with STECs may play a role in causing hemorrhagic enteritis in calves.
- Application of CELMANAX and Dairyman's Choice alleviated STEC shedding and mycotoxin/STEC interactions that lead to disease.

**FIGURE 2:** Impact on cytotoxicity of mycotoxin extracts from calf feed rations.




(n=3; ***$P$=0.001)

To learn more about CELMANAX contact your nutritionist, veterinarian or ARM & HAMMER™ representative or visit AHfoodchain.com.

1 Baines, et al. *Toxins* 2013;5:1872-95; doi:10.3390/toxins510187