

Research Notes

Arm & Hammer Animal and Food Production



Effects of CERTILLUS on rumen fibrolytic microbial communities

CERTILLUS™ Targeted Microbial Solutions™ use proprietary strains of *Bacillus* selected to combat specific pathogenic challenges.

STUDY OVERVIEW^{1,2}

The major fibrolytic bacteria in the bovine rumen are *Fibrobacter* and *Ruminococcus* species. *Fibrobacter* types I, II and IV comprise approximately 80% of the total *Fibrobacteres* in cattle rumen. Two trials were performed to determine the effects of CERTILLUS treatment on dairy cattle. In both, cattle rumen fluid was taken via intubation and snap-frozen on dry ice until processing. DNA was extracted and quantitative real-time PCR was performed to determine the relative abundance of the major fibrolytic bacteria in the rumen.

RESULTS

Farm A

All three *Fibrobacter succinogenes* types tested showed a significant increase in treated rumen fluid, compared to untreated (control) rumen fluid ($P=0.001$, $P=0.05$, $P=0.05$ for *F. succinogenes* types I, II, and IV, respectively; Figure 1). Neither *Ruminococcus* species showed a significant difference between treated and control.

Farm B

At day 60, there was no statistically significant ($P \leq 0.05$) change in abundance of any of the five fibrolytic bacteria analyzed (Figure 2). By day 140, both *R. albus* and *R. flavefaciens* were more abundant in treated animals compared to control animals ($P=0.0003$ and $P=0.008$, respectively). Additionally, *F. succinogenes* II and *F. succinogenes* IV were trending toward increased abundance in treated animals at day 140 ($P=0.07$ and $P=0.07$, respectively).

FIGURE 1: FARM A. Fold-change in fibrolytic bacteria over time in rumen fluid samples.

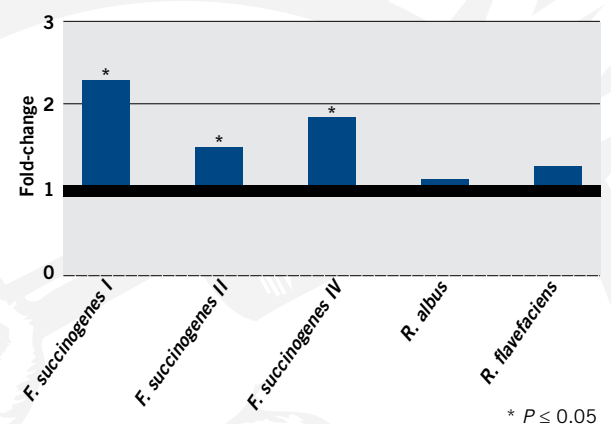
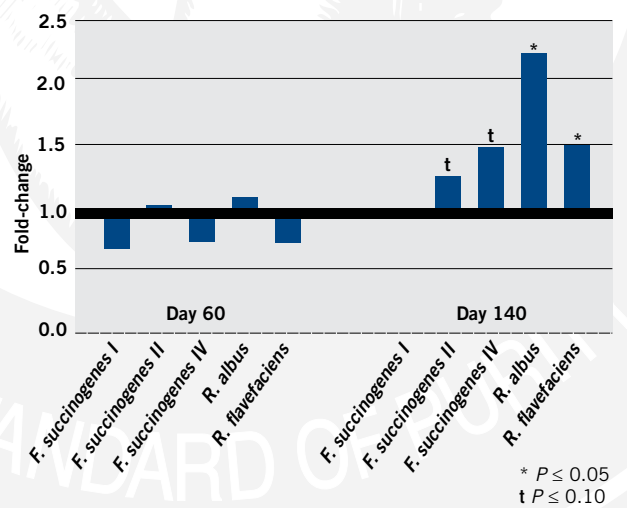


FIGURE 2: FARM B. Fold-change in fibrolytic bacteria over time in rumen fluid samples.



SUMMARY

This increase in the major fiber degrading bacteria in the rumen indicates a greater capacity for forage digestion and precedes increased milk production in CERTILLUS-treated cattle. It seems that the mode of action of CERTILLUS™ is highly dependent on dietary and possibly other environmental factors not described here.



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1 Kobayashi Y, Shinkai T, Koike S. Ecological and physiological characterization shows that *Fibrobacter succinogenes* is important in rumen fiber digestion — Review. *Folia Microbiol* 2008;53:195-200.

2 Neumann AP, McCormick CA, Suen G. *Fibrobacter* communities in the gastrointestinal tracts of diverse hindgut-fermenting herbivores are distinct from those of the rumen: Ecology of *Fibrobacter* in hindgut-fermenting herbivores. *Environmental Microbiology* 2017;19:3768-3783.

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