

Effect of Three Different SmartPak Equine Formulations Containing Diamond V Original XPC™ Ultra on Volatile Fatty Acid (VFA) Production in an In Vitro Equine Intestinal Model

Diamond V Research & Innovation Center, Cedar Rapids, Iowa, 2019

Introduction

The objective of this study was to demonstrate that the three ColiCare Eligible Supplements SmartDigest® Ultra, SmartDigest® Ultra Pellets, and SmartGI® Ultra Pellets — which all contain Diamond V Original XPC Ultra — support the normal, healthy structure and function of the hindgut of the horse by producing higher levels of VFAs than hay alone.

Volatile Fatty Acids (VFAs) such as acetate, propionate, and butyrate are the main product of fermentation in the equine hindgut. Not only are they a major source of energy for the horse, but they also help maintain the health of the cecum and colon by supporting cell growth, blood flow, and the normal secretory and absorptive functions of the intestine. In this experiment, improvements in VFA production would likely be due to an increase in feed conversion and availability of nutrients that can be attributed to XPC Ultra and other active ingredients of the three SmartPak formulations.

The research model used in the study — the in vitro intestinal activity modifier model (IAMM) — mimics the microbiological activity occurring in the hindgut (cecum and colon) of equids. It was developed internally by Diamond V to provide empirical data while minimizing host variables. Diamond V has utilized the IAMM across multiple species to determine VFA production.

Materials and Methods

Samples of the three SmartPak formulas, the inactive ingredients for each (carriers), and XPC Ultra were obtained and added to separate test tubes after normalizing the ratio of active and inactive ingredients to a fixed amount of XPC Ultra. Pre-digested alfalfa/timothy hay served as the control as well as the substrate for the three formulations. The hay was pre-digested by treating with the enzymes pepsin and pancreatin first in an acidic then in a neutral environment to mimic what happens to feed in the stomach before it reaches the large intestine. The resulting material was filtered and dried, then 0.3 grams was added to each test tube. Following Diamond V method IAMM RIC-Lab-0008, fresh manure as a source of live microorganisms was collected from three horses and prepared, then 30 ml was added to each test tube. The test tubes were then incubated anaerobically at 37.2°C for 24 hours. VFA concentrations were analyzed by gas chromatography.

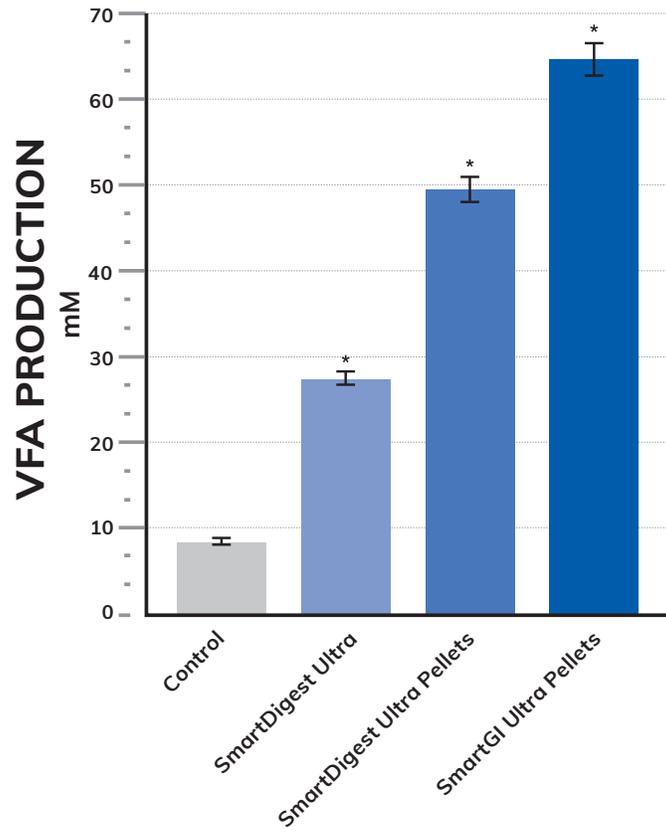
The experiment was performed with five replicates per treatment and was repeated four times. Data outliers falling outside two standard deviations were removed and remaining data analyzed using the GLM model of JMP (SAS Institute, Inc.).

Results

- The inactive components in all formulations contained readily fermentable nutrients and subsequently increased VFA production compared to control alone
- With the addition of XPC Ultra, VFAs increased beyond that produced by the inactives alone
- All SmartPak formulations produced higher acetate, propionate, butyrate, and total VFAs compared to control
- SmartDigest Ultra and SmartDigest Ultra Pellets produced significantly higher acetate, butyrate, and total VFAs compared to control, and were significantly different from each other
- SmartGI Ultra Pellets produced the highest acetate, propionate, butyrate, and total VFAs

Conclusion

Through the use of the Diamond V in vitro intestinal activity modifier model (IAMM), it was demonstrated that SmartDigest® Ultra, SmartDigest® Ultra Pellets, and SmartGI® Ultra Pellets — which all contain XPC Ultra — produce higher levels of VFAs than an alfalfa/grass hay mix alone and may support the normal, healthy structure and function of the hindgut of the horse.



*P<0.05

Source: Diamond V Research & Innovation Center, Cedar Rapids, Iowa