



RESEARCH >

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Is Added Yeast Culture Required in Diets for Horses to Increase Nutrient Digestibility?

A SUMMARY OF RESEARCH CONDUCTED BY PURINA ANIMAL NUTRITION, EXAMINING THE EFFECTS OF ADDED YEAST CULTURE ON NUTRIENT DIGESTIBILITY AND MANURE CHARACTERISTICS IN HORSES.¹⁻⁴

< INTRODUCTION >

All yeast additives included in equine feeds are not created equal. There are many different types of yeast additives on the market, each expressing slightly different functions and benefits. This can be due to strain, methods of manufacture, application and more. The National Research Council's *Nutrient Requirements of Horses* cites a variety of studies utilizing yeast, touting "results equivocal across studies," "improvements in nutrient digestibility are suggested but the exact mechanism is not evident" and "application of non-fermentative yeast cultures requires further study in horses."⁵ To that end, Purina continues to conduct research looking at numerous yeast compounds from a variety of sources and their effects on horse performance. In this trial, we specifically evaluated the effects of adding traditional *Saccharomyces cerevisiae* to an equine feed on the digestibility of organic matter and fiber, along with manure characteristics. Full results of a series of larger trials are available in published research papers as noted below and by contacting Purina Animal Nutrition.

< MATERIALS AND METHODS >

Ten American Quarter Horse geldings (4.5-16 yr of age; mean BW 522 kg ± 46 kg) were included in a randomized crossover design, including five treatment groups. The groups were: 100% pelleted diets formulated with yeast (YEAST); 100% pelleted diet formulated without yeast (CTRL); 50:50 pelleted diet with yeast and orchard grass hay (YEAST + HAY); 50:50 pelleted diet without yeast and orchard grass hay (CTRL + HAY); and 100% orchard grass hay (HAY). Yeast diets were formulated to provide a minimum of 10g of yeast per horse per day. All diets met or exceeded NRC nutrient requirements for a horse at average maintenance. The base pelleted feed was Purina® Horse Chow®. Horses were acclimated to each treatment for 17 days, followed by full fecal and urine collection for 4 days. All horses were acclimated to digestibility harnesses prior to the study to facilitate total collection of feces and/or urine. Total daily diet quantities were offered at 2.0% BW, with amounts adjusted weekly based upon body weight data. During the collection periods, total fecal mass was quantified twice daily and subsamples retained from each collection. Samples were dried, ground and subsampled from d 1, 8 and 15 for analyses. Representative fecal samples were analyzed by Dairy One Forage Lab using

¹ME Gordon, MS Edwards, CR Sweeney, ML Jerina. 2013. Effects of added chelated trace minerals, organic selenium, yeast culture, direct-fed microbials and Yucca schidigera extract in horses. Part I: Blood nutrient concentration and digestibility. *Journal of Animal Science* 91(8):3899-908.

²ME Gordon, MS Edwards, CR Sweeney, ML Jerina. 2013. Effects of added chelated trace minerals, organic selenium, yeast culture, direct-fed microbials and Yucca schidigera extract in horses. Part II: Stock-piled manure characteristics. *Journal of Animal Science* 91(8):3909-3016.

³MS Edwards, ME Gordon. 2013. Replacement of cool season grass hay with pelleted feeds consumed by Quarter Horse geldings Part I: Digestibility. *Journal of Equine Veterinary Science* 33(5); 367.

⁴MS Edwards, ME Gordon. 2013. Replacement of cool season grass hay with pelleted feeds consumed by Quarter Horse geldings Part II: Impact on stockpiled manure characteristics. *Journal of Equine Veterinary Science* 33(5); 367-368.

⁵National Research Council. 2007. *Nutrient Requirements of Horses*, 6th revised edition. The National Academies Press.

< MATERIALS AND METHODS (CONTINUED) >

wet-chemistry methods for dry matter (DM), acid detergent fiber (ADF) and neutral detergent fiber (NDF). Apparent nutrient digestibility (%) was calculated as: $100 \times (\text{nutrient intake} - \text{fecal nutrient excretion}) / \text{nutrient intake}$. Fecal measurements of DM, pH, total N, ammonia N, P, K and total ammonia were performed by A&L Great Lakes Laboratories. Analysis of variance was done with mixed models (SAS 9.2 2010), and least squares means compared with Fisher's least significant difference ($P < 0.05$).

TABLE 1

	100% PELLETTED YEAST	100% PELLETTED CTRL	P-VALUE
SOLIDS, %	31.78 ± 0.71	33.08 ± 0.71	0.0919
TOTAL N, %	0.42 ± 0.02	0.41 ± 0.02	0.5601
AMMONIA N, %	0.08 ± 0.01	0.06 ± 0.01	0.4222
P, %	0.33 ± 0.01	0.33 ± 0.01	0.6944
FECAL AMOUNT, KG (FRESH WEIGHT)	14.34 ± 0.84	15.05 ± 0.84	0.5644
TOTAL AMMONIA, MG ¹	504.53 ± 113.96	535.98 ± 113.96	0.4279

< RESULTS >

For organic matter, NDF, and ADF digestibility, adding yeast to pelleted diets fed both with and without hay did not improve digestibility of the diet (Figures 1-3). In addition, fecal pH was not affected by the inclusion of yeast culture (Figure 4). When comparing the manure characteristics of % solids, total nitrogen, ammonia nitrogen, total ammonia, % phosphorus and total fecal amount, the addition of yeast culture did not affect these parameters (Table 1).

< IMPLICATIONS >

Although the addition of certain types of yeast cultures may be beneficial to horses under specific conditions, adding traditional *Saccharomyces cerevisiae* to a well-established equine feed did not improve fiber digestibility. When healthy horses at maintenance are fed readily digestible concentrate feeds and good quality hay, yeast additives may have limited benefit. The inclusion of yeast additives in equine diets should be accompanied by quality research, demonstrating efficacy and measurable benefit to the horse.

FIGURE 1 Organic Matter Digestibility

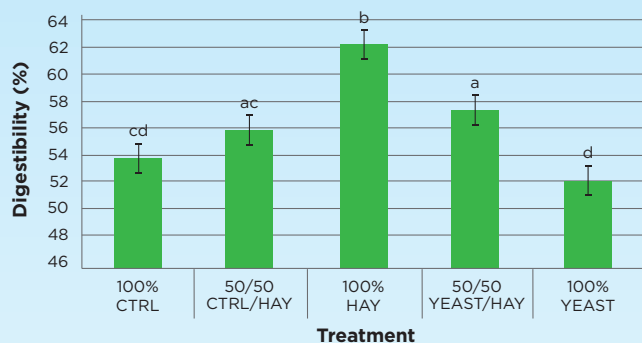


FIGURE 2 NDF Digestibility

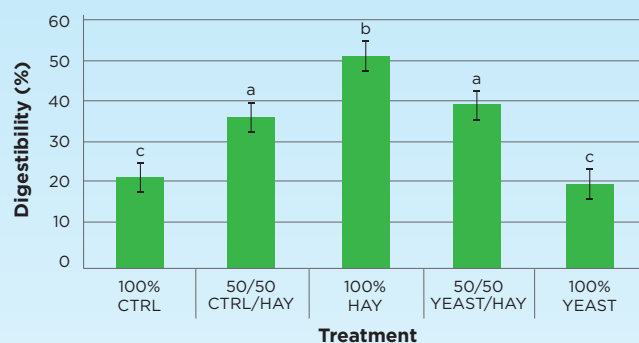


FIGURE 3 sADF Digestibility

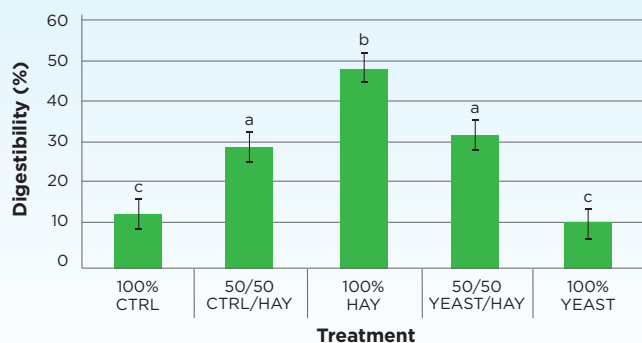
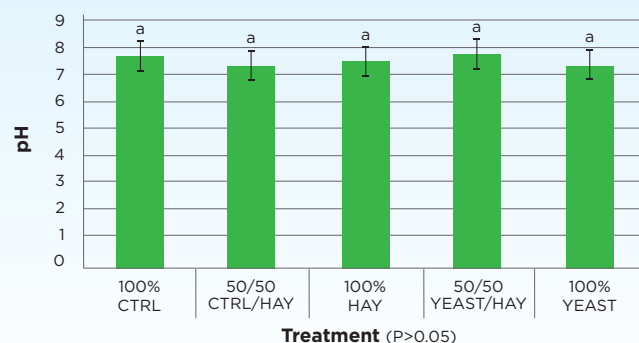


FIGURE 4 Fecal pH



< FOR MORE INFORMATION > Contact your local Purina representative if you would like more information about this study.