



RESEARCH ■ REVIEW >

RESEARCH >

Purina® Equine Senior® Horse Feed with ActivAge® Supports Metabolic Function in Senior Horses

A SUMMARY OF RESEARCH CONDUCTED AT THE PURINA ANIMAL NUTRITION CENTER EVALUATING THE EFFECTS OF FEEDING PURINA® EQUINE SENIOR® HORSE FEED WITH ACTIVAGE® TO SENIOR HORSES ON METABOLIC HEALTH.¹

< BACKGROUND >

Metabolic health is a significant consideration for horse owners. However, as horses age, many develop systemic health conditions that impact metabolic health such as insulin resistance, Equine Metabolic Syndrome, and Pars Pituitary Intermedia Dysfunction (PPID). In fact, it is estimated that approximately 20% of aged horses are at risk of developing an endocrine disorder. The management of metabolic function in horses is mainly conducted through alterations to the diet (limiting non-structural carbohydrates; NSC), management (limitation on pasture access), and through veterinary intervention. Purina® Equine Senior® Horse Feed has a controlled starch and sugar formula designed to minimize the overall levels of NSC in the horses' diet, which is the main consideration when feeding horses with impaired metabolic health. ActivAge® prebiotic is a unique feed additive that provides the horse with the beneficial products of *Saccharomyces cerevisiae* fermentation that have been shown to improve various physiological systems in senior horses.² The objective of this trial was to evaluate the effects of feeding Purina® Equine Senior® with ActivAge® on the metabolic response in aged horses.

< MATERIALS AND METHODS >

American Quarter Horse geldings (n=10; average age = 19 ± 0.6 yr; average BW = 587.5 ± 22 kg) were used in this trial in a randomized cross-over design in which all horses completed both treatments. Horses in the TRT group received 0.36 kg/45.5 kg BW per day of Purina® Equine Senior® Horse Feed formulated without ActivAge® in addition to a treatment pellet fed at 0.45 kg/day containing ActivAge®. Horses in the CON group received 0.36 kg/45.5 kg BW per day of Purina® Equine Senior® formulated without ActivAge® in addition to a control pellet of wheat middlings fed at 0.45 kg/day. All horses were offered 1.25% of their BW daily as Timothy grass hay. Diets were split evenly into AM (0700) and PM (1500) feedings daily. Horses were housed in individual stalls with individual drylot turnouts and had free-choice access to white salt blocks.

¹ HR 303. The effects of ActivAge on the joint, metabolic, inflammatory, and overall health in senior horses. Jacobs, R.D. et al. 2020. Internal Research, PANC.

² A.A. Adams, et al. The effect of n=3 polyunsaturated fatty acids (DHA) and prebiotic supplementation on inflammatory cytokine production and immune responses to vaccination in old horses. Journal of Equine Veterinary Science, Volume 35, Issue 5, 407 – 408. ESS, St Pete, FL, May 2015.

A variety of techniques were utilized to evaluate the effects of ActivAge® on the metabolic function of horses. These included the following:

- 1) Glucose and insulin response to feeding (GIRF):** In this test, horses were fed a meal of Purina® Equine Senior® Horse Feed equal to their AM feeding amount, either with or without the added ActivAge® treatment pellet. Prior to feeding, a jugular catheter was placed, and blood samples were obtained prior to and every 30 min after feeding for 360 min. The samples were analyzed for serum glucose and plasma insulin and response curves were produced detailing the horses' ability to metabolically respond to the feeding. Horses had been consuming their assigned dietary treatments for 28 d prior to the GIRF.
- 2) Combined glucose and insulin tolerance test (CGIT):** The CGIT is a measure of whole-body insulin resistance that works by determining the individual horses' response to intravenous dextrose and insulin administration. For this test, horses were fasted overnight, and were fitted with jugular catheters prior to the start of the test. At timepoint 0, horses were administered dextrose (150mg/kg), immediately followed by insulin (0.1 U/kg) intravenously over the course of 1-2 min. Blood samples were collected at 0, 1, 5, 15, 25, 35, 45, 60, 75, 90, 105, 120 min post injection and analyzed for serum glucose and plasma insulin. Horses had been consuming their assigned dietary treatments for 35 d prior to the CGIT.
- 3) Circulating levels of glucagon-like protein 1 (GLP-1):** There are a variety of circulating markers of metabolic health that have been utilized in horses to provide measures of metabolic health. Glucagon-like protein 1 is a protein known as an incretin that stimulates insulin release. Blood samples were obtained on d 0, 14, 28, and 42 post dietary transition and analyzed for levels of circulating GLP-1 via an equine specific ELISA.

< RESULTS >

All horses remained healthy through out the course of the trial. Data below are expressed as mean ± SEM.

- 1) Glucose and insulin response to feeding:** Horses in both CON and TRT groups had similar glucose responses to feeding. No differences were observed in peak glucose response or area under the curve (AUC; **Figure 1**). The insulin response to feeding was impacted by treatment group with the TRT horses responding with a lower insulin level ($P=0.07$) and a decreased AUC ($P=0.02$) compared to the CON horses (**Figure 2**).
- 2) Combined glucose and insulin tolerance test:** Similarly, to the GIRF results, horses in the CON and TRT groups had similar glucose curves in response to the dextrose and insulin administration (**Figure 3**). The AUC for insulin in the TRT group was lower compared to the CON group ($P=0.10$; **Figure 4**).
- 3) Circulating levels of glucagon-like peptide 1:** Horses in both the CON and TRT groups had similar starting levels of GLP-1 at baseline but as the study progressed, GLP-1 levels rose in CON horses while they stayed lower in TRT horses over the 42-d collection period (**Figures 5-6**).

< CONCLUSIONS AND IMPLICATIONS >

The objective of this trial was to evaluate the effects of feeding Purina® Equine Senior® with ActivAge® on the metabolic response in aged horses. Metabolic health remains of paramount interest to horse owners and is closely tied to overall systemic health in horses. In both the GIRF and the CGIT, horses had a similar glucose response to feeding or administration, respectively. However, the insulin response was lower in horses consuming ActivAge® prebiotic. The GLP-1 results may indicate a possible mechanism by which ActivAge® supports metabolic health. The epithelial cells of the intestine are glucose-dependent, requiring increased levels of glucose when stressed. ActivAge® prebiotic functioning to support the intestinal function of horses may lessen this requirement for glucose, thus decreasing the amount of GLP-1 secreted to stimulate insulin release.

Overall, these data indicate that when fed as part of a complete feeding management plan, Purina® Equine Senior® Horse Feed with ActivAge® can support the metabolic health and function of senior horses. It is important to remember to work with a veterinarian for any health concerns that you may have for your horse. For horses deemed insulin resistant and/or very sensitive to NSC content in the diet, other feeds may be more appropriate for these horses, including Purina® WellSolve L/S®, Enrich Plus® Ration Balancer, Omega Match® Ration Balancer or another nutritionist and veterinarian guided program.

FIGURE 1

Glucose response to a GIRF in horses fed Purina® Equine Senior® Horse Feed with and without ActivAge®. No significant differences were observed between treatment groups.

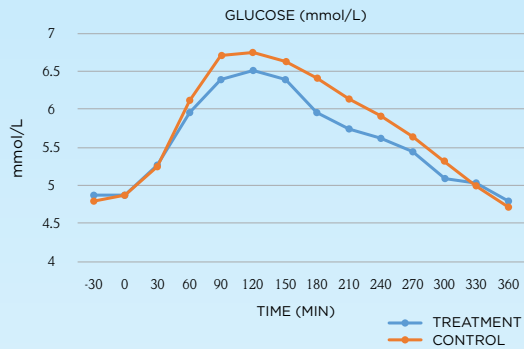


FIGURE 2

Insulin response to a GIRF in horses fed Purina® Equine Senior® Horse Feed with and without ActivAge®.

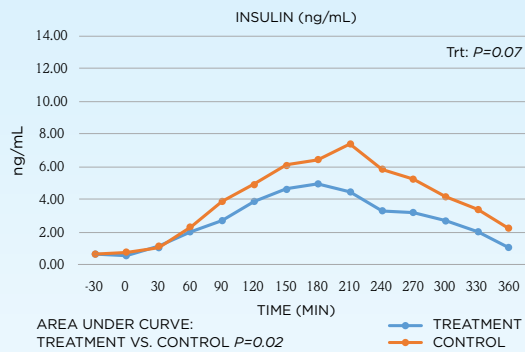


FIGURE 3

Glucose response to a CGIT in horses fed Purina® Equine Senior® Horse Feed with and without ActivAge®. No significant differences were observed between treatment groups.

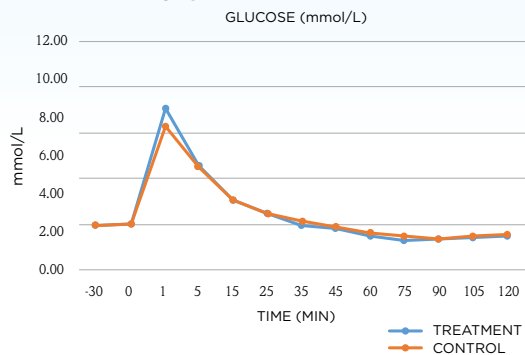


FIGURE 4

Glucose response to a CGIT in horses fed Purina® Equine Senior® Horse Feed with and without ActivAge®.

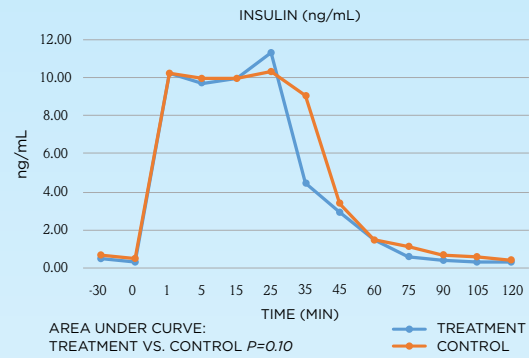


FIGURE 5

Glucagon-like peptide 1 levels in horses fed Purina® Equine Senior® Horse Feed with and without ActivAge®.

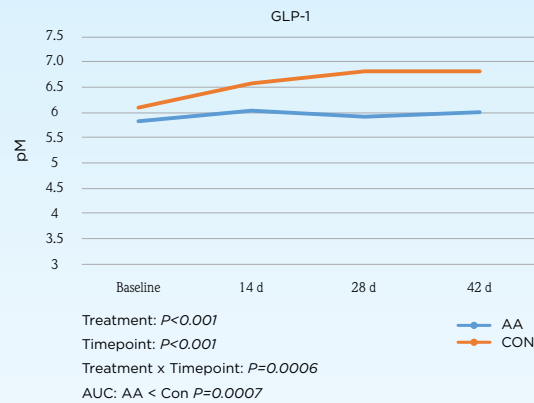
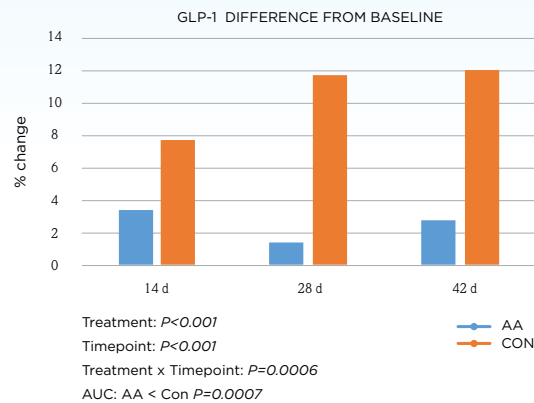


FIGURE 6

Percent change in glucagon-like peptide 1 levels in horses fed Purina® Equine Senior® Horse Feed with and without ActivAge®.



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