



## RESEARCH ■ REVIEW >

# RESEARCH

## Feeding Management and Veterinary Care Play an Important Role in Helping Horses to Optimally Chew and Consume Feed

A SUMMARY OF RESEARCH CONDUCTED AT THE PURINA ANIMAL NUTRITION CENTER EVALUATING HOW A VARIETY OF MANAGEMENT FACTORS CAN INFLUENCE THE CHEWING CHARACTERISTICS IN HORSES.<sup>1</sup>

### < BACKGROUND >

Feeding management is an important factor when developing a feeding plan for senior horses. While feed selection is critical to ensuring a senior horse receives optimal nutrition, there are a variety of factors outside of feed choice that should be considered. Most managed horses are meal fed, receiving 2-3 concentrate meals daily with either forage or no feedstuffs between meals. Often times, the period of time between meals is inconsistent resulting in situations in which horses may react differently to feedings. In addition, a sometimes-overlooked component of feed selection is the quality of the individual horses' dentition. The mechanical breakdown of feedstuffs via mastication is the primary digestive function in the mouth, and dental abnormalities may impact the horses' ability to adequately reduce particle size. Managing the horse's dental health is critical to ensure optimal utilization of feed offered to the horse. To evaluate if the time of day, and how dental intervention impacted the chewing characteristics of horses, a pair of studies were conducted to evaluate these parameters utilizing Purina® Equine Senior® Horse Feed as a base feed.

### < MATERIALS AND METHODS >

Electromyography was utilized to measure the muscle activity in the facial muscles of horses during feed consumption. The BIOPAC®, BioNomadix® 2-channel EMG system was used to measure the electrical impulses in the M. Masseter muscles surrounding the horses jaw. Adhesive electrodes were affixed to both sides of the horses' face and used to measure the muscular activity. Data were collected and the impulses were analyzed utilizing proprietary software to determine chew rate, strength, and duration. All data were then analyzed for statistical significance.

**Study 1:** To determine the effect of feeding time on chewing characteristics, mature Quarter Horse geldings (n=4) were utilized in a trial in which they were offered 1.8 kg of Purina® Equine Senior® Horse Feed for 20 days at 0700 (AM) and 1430 (PM). Horses also received 1.5% BW as mixed grass hay following the PM feeding daily. Horses finished their hay in the period between the PM and subsequent AM feeding. The amount of time between AM and PM feedings was approximately 7.5 hrs,

<sup>1</sup>HR 296. The effect of dentition on chewing characteristics. Internal research. Purina Animal Nutrition Center. 2019.

<sup>2</sup>Electromyographic measurement of horses chewing senior feed at different heights and time of day. Are there differences? ME Gordon et al., 2019. *Journal of Equine Veterinary Medicine*.

while the time between PM and AM feedings was approximately 16.5 hrs. Data were collected at all feedings and analyzed for differences in AM vs. PM feedings.

**Study 2:** To evaluate the effect of dentition on chewing characteristics, mature Quarter horses (n=4) and Thoroughbreds (n=4) with an average age of 17.2 years were utilized in a cross-over trial. Prior to the start of the trial, all horses were examined by a veterinarian and assigned a dental score based on the quality of dentition. No horses utilized on the trial had received any dental intervention for 12 months prior to starting. The trial was separated into pre-dental and post-dental periods consisting of 3 weeks of data collection each. Following the final week of data collection in the pre-dental period, all horses underwent a dental floating by a veterinarian. The average dental score of horses during the pre-dental period was 3.13 indicating the presence of dental abnormalities such as malocclusions and sharp points. Following the mid-point floating, dental scores improved to an average of 2.0 indicating that malocclusions had been resolved and few sharp points were present. During each period, 5 dietary treatments (long stem hay, chopped hay, 75% Purina® Equine Senior® Horse Feed with 25% added chopped hay, soaked Purina® Equine Senior®, and dry Purina® Equine Senior®) were evaluated for 5 consecutive feedings each.

## < RESULTS >

All data are presented as means ± SEM. During the AM feedings, horses had stronger and longer chews, and a higher maximum amplitude during chewing, compared to the PM feeding (**Figure 1**;  $P<0.05$ ). Further, horses had a faster chew rate during the AM feeding compared to the PM feeding (**Figure 2**;  $P<0.05$ ). Chew length was longer for horses pre-dental (0.251 sec) vs. post-dental (**Figure 3**; 0.235 sec;  $P<0.05$ ). Chew strength was stronger pre-dental (0.04 mV/sec) vs. post dental (**Figure 4**; 0.03 mV/sec;  $P<0.05$ ). Horses pre-dental had a higher maximum amplitude of chews pre-dental (0.275 mV) vs. post-dental (**Figure 5**; 0.235 mV;  $P<0.05$ ). Chew rate was lower pre-dental (1.46 chews/sec) vs. post-dental (**Figure 6**; 1.54 chews/sec  $P<0.05$ ). Dietary treatment impacted chewing characteristics, however, no interactions existed between individual feedstuffs and chewing characteristics pre- and post-dental.

## < CONCLUSIONS AND IMPLICATIONS >

Feeding management is a critical factor to ensure that senior horses consume their feeds appropriately. Data from this study indicates that the time of day can impact the chewing characteristics for horses. It is possible that the longer duration between PM and AM feedings, vs. the shorter period of time between AM and PM feedings was responsible for the differences observed. Horses may have been more hungry at the AM feeding or were possibly anticipating their meal at this time. Dentition played a role in chewing characteristics as well. Horses with aberrant dentition had a more difficult time chewing their daily feed compared to the same horses following a proper dental floating. More research is necessary to understand how chewing characteristics impact saliva production and overall feed consumption in horses, but these data indicate that feeding management should not be overlooked in senior horses.

FIGURE 1

Chew strength of horses consuming feed during AM and PM feedings.

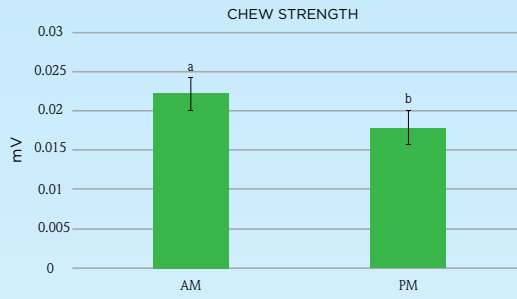


FIGURE 2

Chew rate of horses consuming feed during AM and PM feedings.

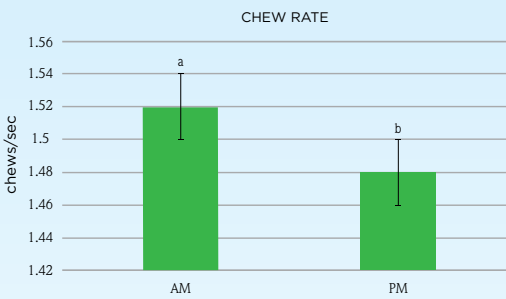


FIGURE 3

Chew length of horses consuming feed pre- vs. post-dental.

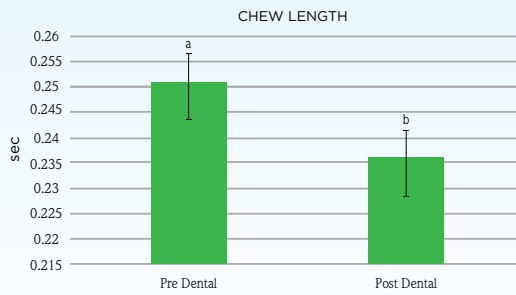


FIGURE 4

Chew strength of horses consuming feed pre- vs. post-dental.

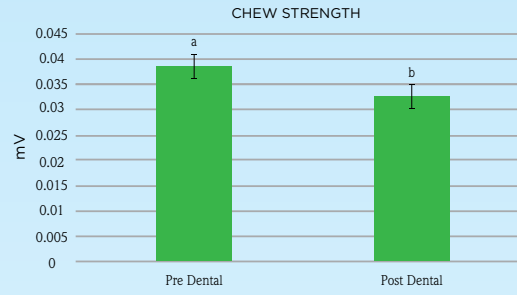


FIGURE 5

Chew amplitude of horses consuming feed pre- vs. post-dental.

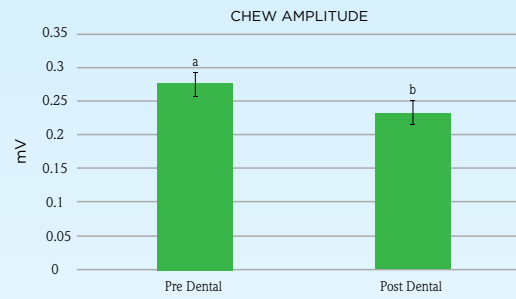
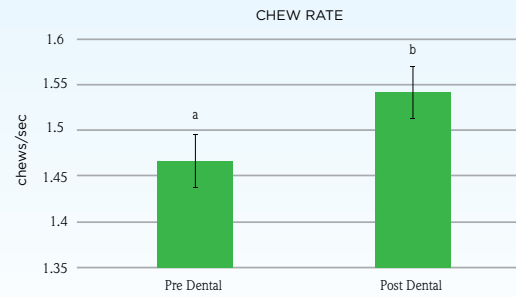


FIGURE 6

Chew rate of horses consuming feed pre- vs. post-dental.



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