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Short Communication

Interaction of Grazing Muzzle Use and Grass Species on Forage Intake of Horses

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ABSTRACT

The impact of horse preference and grass morphology on grazing muzzle effectiveness has not been investigated. The objective of this study was to determine the effectiveness of grazing muzzle use at reducing forage intake when horses grazed grasses with different morphology and preferences. The study was conducted in 2012 and 2013. Four horses were grazed in 2012, and three horses were grazed in 2013. Four species of perennial cool-season grasses were grazed in 2012 including Kentucky bluegrass (*Poa pratensis* L.), meadow fescue (*Schedonorus pratensis* Huds.), perennial ryegrass (*Lolium perenne* L.), and reed canarygrass (*Phalaris arundinacea* L.). In 2013, only Kentucky bluegrass and reed canarygrass were grazed because of winter kill of other species. Horses were allowed to graze a small pasture seeded with an individual species for 4 hours each day in June and August of 2012 and August and September of 2013. Horses grazed the same grass species for two consecutive days, one day with a muzzle and one day without. Before and after each grazing, a strip was mechanically harvested to determine initial and residual herbage mass. The difference was used to estimate forage intake. The effectiveness of a grazing muzzle was not affected by forage species ($P \geq .05$). Use of a grazing muzzle decreased the amount of forage consumed by an average of 30% compared with not using a grazing muzzle ($P < .0001$). Results will aid horse owners and professionals in estimating forage intake of muzzled horses on pasture.

1. Introduction

Recent research has shown that 21%, 19%, and 14% of horses in the United Kingdom [1], New York [2], and Minnesota [3], respectively, were considered "fleshy" with a body condition score [4] of ≥7. In an attempt to reduce horse body condition, owners have sought to restrict forage intake by a number of methods, including eliminating or decreasing the amount of time on pasture; however, restricted grazing is not always effective. Glunk et al [5] found that horses were able to increase their dry matter (DM) intake rates with restricted grazing time.

Many horse owners are in need of management strategies that restrict pasture intake while maintaining a horse's natural environment. In recent years, the use of grazing muzzles has gained popularity because its use limits forage intake while still allowing turnout, exercise, and socialization in an outdoor setting. Longland et al [6] found that use of a grazing muzzle reduced forage intake by 83% when ponies grazed an autumn pasture with a sward height of 8–15 cm. However, horses are known to be selective grazers, which may affect the effectiveness of a grazing muzzle. Allen et al [7] determined that horses preferred Kentucky bluegrass (*Poa pratensis* L.) and meadow fescue

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(*Schedonorus pratensis* Huds.), whereas exhibiting less preference for reed canarygrass (*Phalaris arundinacea* L.) and perennial ryegrass (*Lolium perenne* L.). Researchers have observed that grass morphology, or growth type, also affected livestock forage preference [8]; however, it is unknown if horse preference and forage morphology will impact the effectiveness of a grazing muzzle. Therefore, the objective of this research was to determine the effectiveness of grazing muzzle use at reducing forage intake when horses grazed grasses with different morphology and preference.

2. Materials and Methods

2.1. Horses, Forage, and Sampling

All experimental procedures were conducted according to those approved by the University of Minnesota Committee on Animal Use and Care. On August 8, 2011, six replicated plots measuring 3.3 × 6.7 m were planted. Grass species included "Ginger" Kentucky bluegrass, "Remington" perennial ryegrass, "Pradel" meadow fescue, and "Palaton" reed canarygrass. Kentucky bluegrass and meadow fescue were previously determined to be highly preferred, whereas perennial ryegrass and reed canarygrass were determined to be less preferred [7]. Kentucky bluegrass and perennial ryegrass have a prostrate growth habit, whereas meadow fescue and reed canarygrass have an upright growth habit. Therefore, horses were exposed to grasses that were preferred with prostrate growth (Kentucky bluegrass), preferred with upright growth (meadow fescue), less preferred with prostrate growth (perennial ryegrass), and less preferred with upright growth (reed canarygrass).

Research was conducted in June and August of 2012 and August and September of 2013 when grasses reached a height of 15–20 cm [7,9]. In 2012, all four grass species were grazed, whereas in 2013, only Kentucky bluegrass and reed canarygrass were grazed because of winterkill of perennial ryegrass and meadow fescue. In 2012, a Latin square design used four of the six replicates, whereas in 2013, a Latin square design was used with six replicates. Before grazing in 2012 and 2013, four adult stock-type horses with a body weight (BW) of 406 kg (standard deviation [SD] ± 107 kg) and three adult stock-type horses with a BW of 557 kg (SD ± 34 kg), respectively, were acclimated to both wearing a grazing muzzle (Weaver, Mt. Hope, OH) and grazing for 4 hours each day on a mixed cool-season grass pasture for 1 week. Before grazing, horses were weighed on a livestock scale, and initial herbage mass was measured by mechanically harvesting a 0.9 × 3.3 m strip from each plot using a flail harvester (Carter Manufacturing Company Inc, Brookston, IN) at approximately 8 AM. Harvested samples were weighed, and subsamples were collected and dried at 60°C in an oven for 24 hours to determine DM.

In 2012, horses were allowed access to two of the four grasses each month. Horses were allowed to graze each species for two consecutive days, one day with the muzzle and one day without the grazing muzzle on a different plot containing the same species. Horses were then switched to the second grass species, and the protocol was repeated. The following month the protocol was repeated to ensure, each horse had access to each grass species both with and without a grazing muzzle. In 2013, horses grazed for four consecutive days each month, with access to both species of forage each month, both with and without the grazing muzzle. While grazing, horses had ad libitum access to water.

After each grazing period was completed, residual herbage mass was estimated by mechanically harvesting a second 0.9 × 3.3 m strip from the opposite side of each plot using the flail harvester at approximately 1 PM. Harvested samples were then weighed, and subsamples were collected and dried at 60°C in an oven for 24 hours to determine DM. Manure was removed, and each plot was mowed to 9 cm and allowed to regrow [7,9]. To estimate total herbage mass consumed, herbage mass densities were calculated from the initial and residual herbage masses using the following equation:

Density (kg/m^2) = weight of strip harvested (kg)/area of strip harvested (m^2).

The density was then extrapolated to the entire plot, and the difference between initial and residual herbage mass was determined to be the amount of forage consumed by the horse.

During the trial period in both years, horses were group housed in a nearby dry lot with ad libitum access to water and a trace mineralized salt block and were group fed a mixed, mostly cool-season grass hay at 1% of herd BW at 4 PM each day. When not grazing, horses were housed in the same dry lot with ad libitum access to water and a trace mineralized salt block and were group fed a mixed, mostly cool-season grass hay at 2% of herd BW split evenly at 7 AM and 4 PM each day. Rations were balanced to meet the horse's nutritional requirements during and between grazing periods [10].

2.2. Statistical Analysis

Data were analyzed using the Proc Mixed procedure of SAS (9.3; SAS Institute, Cary, NC). Variables analyzed included percentage initial herbage mass consumed and percentage reduction. The model included period, species, and muzzle. A $P < .05$ was considered statistically significant.

3. Results

Average percentage initial herbage mass consumed and percentage reduction in year 1 (2012) is shown in Table 1. There was no effect of species ($P = .27$) on initial herbage mass consumed. Although a wide range in consumption values were observed both with (22%–49%) and without (47%–79%) a grazing muzzle, consumption was not different among the forage species. This was likely because of natural variability in forage height and density found within the plots. However, average initial herbage mass consumed was reduced by 29% when the horses grazed while wearing a grazing muzzle, representing a reduction ($P \leq .05$) in consumption for all species except reed canarygrass. Average percentage initial herbage mass consumed and percentage reduction in year 2 (2013) are shown in Table 2. Similar to the previous year, the use of a grazing muzzle was effective at decreasing initial herbage mass consumed by an average of 30% ($P < .001$). However, unlike 2012, there was an effect