

Preference of Complete Pelleted Feeds with Differing Concentrate to Forage Ratios in Two Ages of Horses

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Abstract: Six mature and six yearling geldings were used to investigate the preference of complete pelleted feeds with varying forage to concentrate ratios. Three feeds were tested: high forage (H; 70% forage:30% concentrate), equal forage and concentrate (E) and low forage (L; 30% forage:70% concentrate). Horses were placed in stalls equipped with 2 buckets hung side by side on a wall. To familiarize horses with 2 options of feed buckets, each was given 10 min in the stall with 1 kg oats per bucket. A 6x6 Latin square with a 3x2 factorial treatment structure was used. Three feed combinations (HL, EL and HE) were tested with horses receiving each combination twice with feed position reversed the second time. Buckets were weighed and feed was added. Mature horses received 1 kg per bucket and yearlings received 0.5 kg per bucket. Horses had 10 min to consume the feed(s) and then buckets were removed from stalls and reweighed to determine how much of each feed was consumed. Mature horses showed no preference to position of buckets, however, yearlings consumed more from the right bucket ($P < .05$). Initial bucket choice did not influence overall intake from either bucket. Mature horses showed no preference between L and H or between L and E, however E was preferred over H ($P = .05$). Yearlings showed no preference between L and H, however, E was preferred over L ($P = .075$) and H ($P = .004$).

Key words: Horse, preference, forage, concentrate

Introduction

Preference studies have long been used to determine which types of feeds equids prefer. The preferences of ponies for sucrose, grains and by-product feeds have been evaluated by Hawkes *et al.* (1985). Schryver *et al.* (1987) studied the preferred inclusion levels of sodium chloride and sodium bicarbonate in diets for yearling ponies. Studies have also been conducted on grasses (Assef *et al.*, 1999), hays (Lawrence *et al.*, 1987 and LaCasha *et al.*, 1999), by-product feeds (Ott *et al.*, 1979) and grains (Hawkes *et al.*, 1985). These studies were conducted to help predict acceptability of feed additives and feedstuffs. This information can be quite valuable when formulating diets. However, information on complete feeds seems to be lacking. The purpose of this study was to investigate the preference of three complete pelleted diets differing in forage to concentrate ratios in two ages of horses. It was hypothesized that initial bucket choice would influence intake, but that bucket position would not. Also, it was hypothesized that the horses would prefer the low forage diet due to the high grain content.

Materials and Methods

Six mature geldings (4 Arabians and 2 Andalusians) and six yearling Arabian geldings were used to evaluate three pelleted feeds (Table 1): low forage (L; 30% forage:70% concentrate), equal forage (E; 50% forage:50%

Table 1: Percentages of feed ingredients in each pelleted feed

	Low Forage	Equal Forage	High Forage
Corn	19%	30%	29.2%
Oats	43%	14.6%	0%
Soybean Meal	6%	4%	0%
Timothy Hay	15%	25%	35%
Alfalfa Hay	15%	25%	35%
Lysine	0.09%	0.15%	0.23%
Vitamin/Mineral Mix	0.015%	0.15%	0.15%
Salt	0.06%	0.05	0.08%
Dical Phosphate	0.55%	0.55%	0%
Limestone	1.15%	0.45%	0%
Phosphate	0%	0.05%	0.4%
GE (Mcal/kg)	3.8	3.6	4.0
DE (Mcal/kg)	2.6	2.5	2.4
CP (%)	13.9	14.2	12.7
NDF (%)	29.8	29.2	35.3
ADF (%)	16.7	18.3	23.1

concentrate) and high forage (H; 70% forage:30% concentrate). Pellet size was consistent in all three feeds and they were formulated as a complete balanced diet based on NRC recommendations for weanling horses. Percent dry matter was the same for all three feeds (90.8%). Horses were maintained on pasture and fed a diet of oats, whole soybeans and grass hay at .75% BW, .05% BW and 1% BW respectively in addition to fresh forage from the pasture. Any food consumed during this choice study was in addition to the horses' normal feed. In order to familiarize horses with having two feed buckets in their stall, each horse was given 10 min in a stall with 1 kg oats per bucket. Once a day between 1100 and 1300, horses were brought in from the pasture and individually placed in 3.1 m x 3.1 m box stalls equipped with 2 feed buckets hung side by side on the west facing wall (Fig. 1). A 6x6 Latin square with a 3x2 factorial treatment design was used. Each horse received each feed combination twice (LE, LH, EH) with the bucket position reversed the second time. Horses were given a choice of two feeds to determine preference, but they were not forced to eat the feed. Each horse was placed into the same stall each time it was brought in, the bucket placement was consistent and all horses ate facing the same direction. Mature horses were given 1.0 kg of each feed and given 10 minutes to consume the feed(s). Yearling horses were given 0.5 kg of each feed and given 10 minutes to consume the feed(s). This amount of feed was approximately .2% BW. When the allotted time for consumption ended, buckets were promptly removed from the stalls and reweighed to determine how much of each feed was consumed. Statistical analysis was performed using PROC GLM in SAS 8.0. Horse, day, feed, bucket location and initial bucket choice were used as class variables.

Results and Discussion

The mature horses showed no preference in bucket location ($P = .71$), however, the yearlings tended to eat more from the bucket on the right side than the left (.36 kg vs. .28 kg; $P = .098$). In this study, we found mature horses showed no preference between right and left bucket position. This is not surprising because the buckets were placed side-by-side in the middle of the wall and horses were individually stalled so there was no competition or pressure from other horses. Typically the mature horses tended to eat rapidly so they would be able to consume as much as possible. When mature ponies were fed varying grains, results show no preference in bucket position and in each trial, the horses always ate some of both feeds offered (Hawkes *et al.*, 1985). Nevertheless, yearlings in our study tended to prefer to eat from the right bucket. This is interesting because stalls on both sides of the aisle were used so the right bucket in half of the stalls was on the door side while in the other half the bucket was closer to the back wall (Fig. 1). Hence, the proximity to the stall door did not seem to be an important factor. Initial bucket choice was recorded as the first bucket that the horse placed his head into and took a bite from. This choice did not influence overall intake from either right or left bucket for yearlings (.31 kg vs. .33 kg; $P = .74$) or for mature horses (.48 kg vs. .45 kg; $P = .75$). As initial bucket choice did not influence overall intake, the horses seem to have made their choice based on feed palatability. Mature horses showed no preference between L and H or between L and E, however, E was preferred over H ($P = .003$). Yearlings showed no preference between L and H, however, E was preferred over H ($P = .004$) and there was a trend for it to be preferred over L ($P = .08$). It was originally hypothesized that the horses would prefer the diet L over H, however, our findings indicate that horses prefer the E over H (Figs. 2 and 3). Oats and corn, ingredients in both E and L, are traditionally considered to be well-liked by horses. In the study by Hawkes *et al.* (1985), ponies preferred whole oats over cracked corn. However, this finding did not hold true in the current study, since the L pellet contained 19% corn and 43% oats, while the E pellet contained 30% corn and 15% oats. Based on this, the oat content of the feed was not the reason for high palatability of E. In a study comparing voluntary intake of different hays by yearling horses, it was found that the horses preferred alfalfa hay over Matua (a cool season hay) and Matua was preferred over bermudagrass (a warm season hay; LaCasha *et al.*, 1999). The L pellet contained 15% alfalfa hay and 15% timothy (a cool season hay), while the E diet contained 25% of each hay. This suggests the increased content of both hays had a positive effect on palatability of the pellet and possibly that horses prefer a certain level of hay in their diet. All three diets were formulated to have the same digestible energy to nutrient ratios. Diet E had the lowest gross energy and if horses were eating to meet energy demands, they would need to eat more of E than the others. However, since horses only had 10 min to consume and that this feed was not their only source of nutrients, it seems unlikely that this was a factor. In contrast, it seems likely that the combination of ingredients in E were more palatable than the combination of ingredients in L and H. The palatability of a complete feed may not be determined by the individual palatability of any one ingredient and it is important to access the whole feed because subtle shifts in feed ingredients may alter the preference of a given feed.

Implications: While no logical reason has been determined for these horses to choose a bucket on one side or the other, this study demonstrated that young horses ate more from the right side than the left. Therefore, when designing future preference studies bucket position must be taken into consideration especially with young horses. Additionally, this study refuted our hypothesis that a high concentrate diet would be the most preferred, although

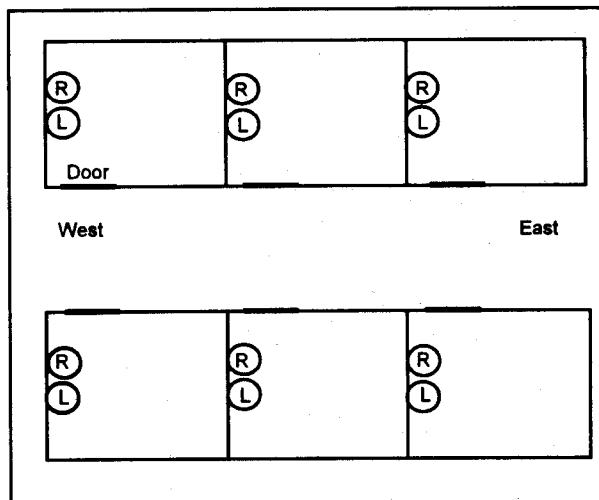


Fig. 1: Diagram of stall setup for preference study

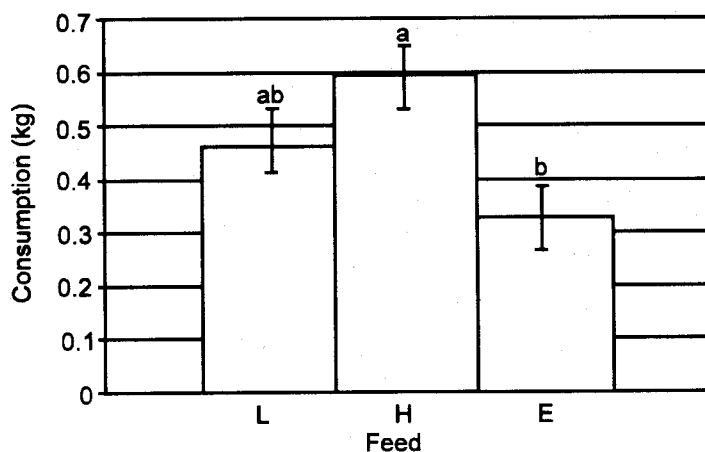


Fig. 2: Average feed consumption of the three diets by mature horses. Bars with the same letters are not different $P > 0.05$

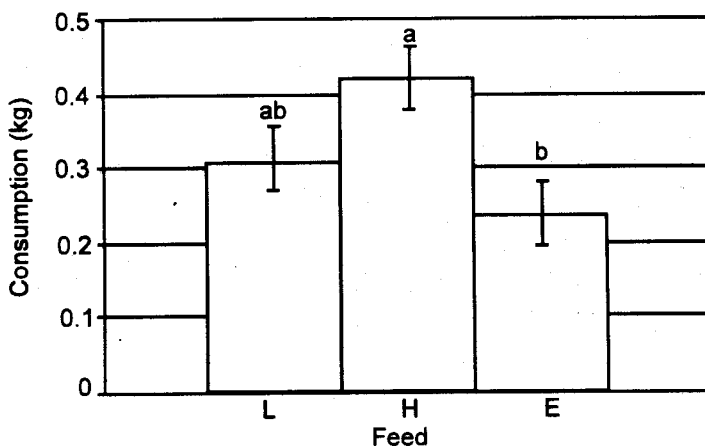


Fig. 3: Average feed consumption of three diets by yearling horses. Bars with the same letters are not different $P > 0.05$

it did confirm that a high forage diet was least preferred. The feed industry may find this information useful as it strives to produce more palatable horse feeds. The incorporation of a substantial amount of forage (50%) was preferred by both young and mature horses and can help compose a complete feed that is not only safe for horses, but is also palatable.

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