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EFFECT OF FEEDING FREQUENCY ON DIGESTION IN PONIES

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The horse is a grazing animal by nature. Free ranging horses spend an estimated 65-75% of their time grazing (Mayes and Duncan, 1986). However, many horses live in confinement. Many of these horses have increased nutrient requirements due to growth, work, gestation or lactation. These horses are often fed a high concentrate diet containing large amounts of starch. Several studies concerning physiological response to a single, large grain meal have been conducted. Source of starch and processing affect digestibility (Meyer *et al.*, 1993) and intake levels above 0.4% of body weight decrease starch digestion in the foregut and increase digestion in the hindgut (Potter *et al.*, 1992). Increased rate of passage decreases digestion prececally and decreases absorption of nutrients (Argenzio *et al.*, 1974; Hintz, 1989). Other physiological responses to a large meal include decreased plasma volume and increased plasma protein (Haupt, 1990).

Table 1. FEEDING SCHEDULE (schedule repeats every 12 hours)

<i>Time of feeding</i>	<i>2 meals/d</i>	<i>4 meals/d</i>	<i>8 meals/d</i>	<i>16 meals/d</i>
09.00 AM	X	X	X	X
10.30 AM				X
12.00 PM			X	X
13.30 PM				X
15.00 PM		X	X	X
16.30 PM				X
18.00 PM			X	X
19.30 PM				X

This experiment was designed to test the hypothesis that increased frequency of feeding will improve nutrient digestion. Four mature Shetland ponies were randomly assigned to one of four dietary treatments. Each horse was fed a complete feed containing forage and grain at 2 % of body weight as either treatment 1, 2 meals/d; treatment 2, 4 meals/d; treatment 3, 8 meals/d; or treatment 4, 16 meals/d (Table 1). The experimental design was a 4 x 4 Latin square design utilizing a 10-d period and a

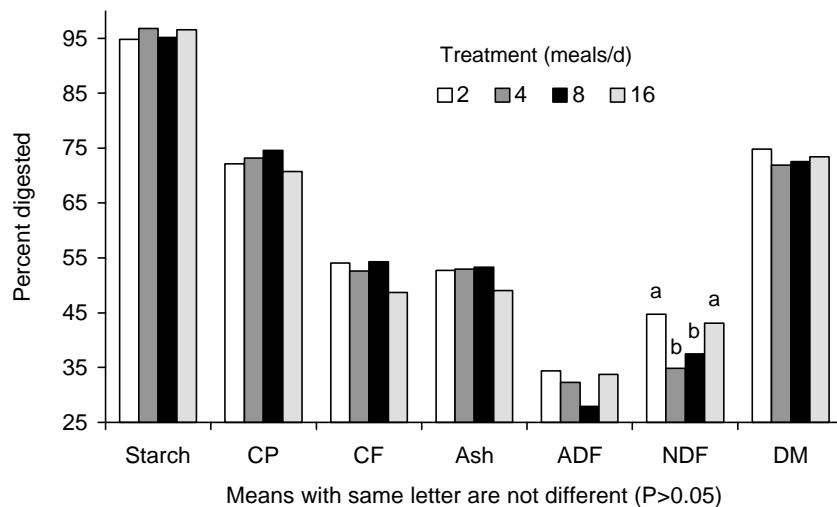


Figure 1. Effects of feeding frequency on digestion of nutrients in a complete feed

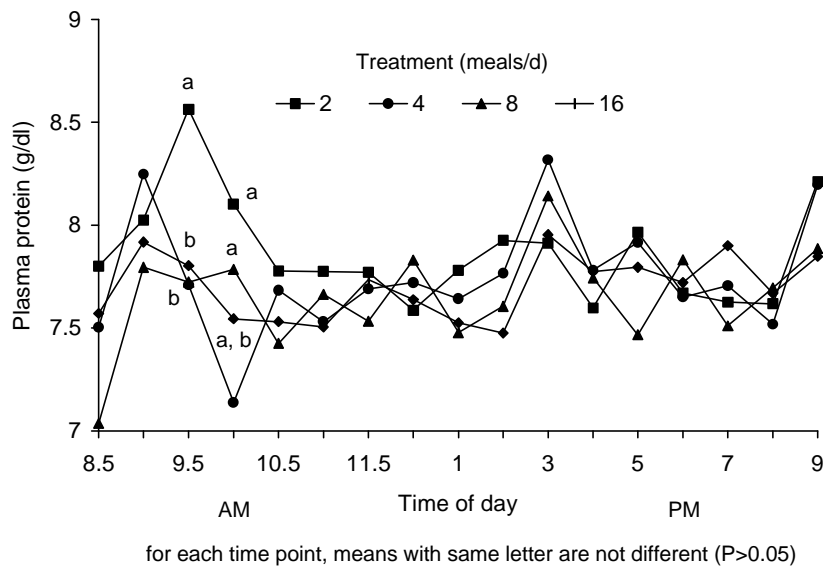


Figure 2. Effect of feeding frequency on plasma protein concentrations

3-d total fecal collection. Starch, crude protein (CP), dry matter (DM), crude fat (CF), acid detergent fiber (ADF), neutral detergent fiber (NDF) and ash digestibilities were determined. Plasma protein and hematocrit were also measured over a 12-h period to evaluate changes in plasma volume.

Feeding frequency did not affect digestion of starch, CP, DM, CF, ADF or ash. Feeding 2 or 16 meals/d increased digestion of NDF ($P<0.05$) (Figure 1). Plasma protein levels increased ($P<0.05$) 30 minutes after the 9 AM feeding when ponies consumed 2 meals/d. At 10 AM, plasma protein decreased ($P<0.05$) when ponies fed 4 meals/d were compared to ponies eating 2 or 8 meals/d (16 meals/d treatment was not different from 4 meals/d treatment because of consistently lower concentrations) (Figure 2).

The present results do not support the hypothesis that increased frequency of feeding is associated with an increase in digestibility. The results may be due to the diet, as it was very low in fiber (26% NDF, 16% ADF). However, the large fluctuation in plasma protein concentration in this study is an indication that water balance is affected by large, infrequent meal feeding. Therefore, the present results suggest that increasing feeding frequency may regulate plasma volume which could be beneficial to stabled horses.

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