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SOCIAL FACILITATION OF FEEDING AND TIME BUDGETS IN STABLED PONIES

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Summary

Eight pairs of pony mares were observed. Members of a pair were housed in adjacent stalls and fed hay ad libitum. The behavior of both ponies was recorded simultaneously in the morning (1000 to 1200 h) and afternoon (1400 to 1600 h) for a total of 117 h. The time budget was: 70.1 ± 8.6% eating; 17.8 ± 7.4% standing (including stand rest, stand alert and stand nonalert); 5.2 ± 7.0% pushing hay; 2.9 ± 1.2% walking; 1.9 ± 2.9% drinking; 1.3 ± 1.1% self-grooming; .2 ± .3% defecating; .06 ± .1% chewing nonfood items; .06 ± .03% urination; .06 ± .1% licking salt; .07 ± .1% pawing hay; .6 ± .7% lying and .07 ± .08% stretching the neck over the stall wall dividing the ponies. While eating, the ponies lifted their heads 25.4 ± 11.0 times/h. In less than one-half of the occasions when urination or defecation was observed, the ponies walked away from the spot where they had been eating to eliminate.

During one-half of the observations, visual contact between the ponies was prevented by a solid partition between the stalls. The ponies spent significantly more time standing nonalert when the partition prevented visual contact (12 ± 7%) than when visual contact could take place (6 ± 3%, $P<.05$). When fresh hay was supplied in the mornings, the ponies spent similar amounts of time eating whether visual contact was allowed or not, but in the afternoon significantly more time was spent feeding when visual contact was allowed (73 ± 4%) than when it was not (60 ± 7%). Less time was spent eating, in the absence of visual contact, despite the presence of auditory and olfactory contact. Apparently social facilitation is important in maintaining feeding behavior in ponies.

(Key Words: Pony, Horse, Feeding, Behavior.)

Introduction

The time budgets of feral horses in Canada (Salter and Hudson, 1979), free-ranging New Forest ponies (Tyler, 1972), Camargue ponies (Duncan, 1980) and feral Chincoteague ponies (Keiper and Keenan, 1980; Keiper, 1981) have been determined. The behavior of domestic horses has received less attention. Francis-Smith et al. (1982) have studied grazing behavior of pastured horses. Doreau (1978) has studied the feeding behavior of stabled horses and Ralston et al. (1979) have studied the feeding behavior of stabled ponies. The only study that reported many behaviors of stalled horses was that of Willard et al. (1977), in which the horses were kept in metabolism crates. We undertook a study of ponies in a more common environmental situation, box stalls.

The purpose of this study was to determine whether there is social facilitation of behavior in horses; that is, does one horse tend to do what the other horse does. Social facilitation might be expected to occur in a herd living animal. The senses involved in socially facilitated behavior were also of interest. Horses might coordinate their activities because they see or hear, or less likely, smell the other horse performing the activity. By removing visual contact between the horses, the importance of sight in social facilitation could be determined. We were also interested in whether time budgets of stabled ponies resembled those of free ranging or feral horses and ponies. Optimal food intake is very important for growth and

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for performance in horses, but anorexia is a common problem in stalled horses in training. The lack of social facilitation might result in less feeding behavior in stalled horses, particularly in situations where they cannot see one another, i.e., while their heads are in a manger or feed bucket, or below the level of stall windows while eating hay from the floor.

Materials and Methods

Nine Shetland-type, pregnant pony mares were observed sequentially (i.e., A and B were observed for 2 wk, then B and C for 2 wk) as eight pairs. The ponies were brought one at a time to the laboratory from pasture, having been randomly selected by the stockman. The ponies had been housed in box stalls on previous occasions and were given 2 to 3 d to habituate to the laboratory stalls before observations began. The pair were kept in adjacent pipe rail stalls measuring 3.53 × 3.28 m or 3.25 × 2.65 m. A mineral salt block mounted on a holder was present in each stall. Automatic waterers were present in the smaller stalls and buckets of water in the larger stalls. No other ponies were visible to the ponies. All of the stalls contained a sloping feed trough that was 76.2 cm long and 33.0 to 50.8 cm deep (sloping outwards). Mixed-grass hay was fed on an ad libitum basis. Fresh hay was placed in the feed troughs 15 to 20 min before the morning observations. The ponies were placed in a paddock (43 × 24 m) for approximately 4 h twice a week.

Each pair was observed as a focal dyad, i.e., both were observed at the same time (Altmann, 1974). The behavior of each pony and the time of initiation of each behavior were recorded so that the minutes spent in each activity state could be calculated. Observations were made in the morning (1000 to 1200 h) and afternoon (1400 to 1600 h). Each pair was observed two to five times at each time period under each visual condition (to be described) for a total of 117 h of observations. Two observers collected data. The observers viewed the ponies simultaneously on several occasions to reduce observer variability.

Each pair of ponies was observed for 2 wk. During 1 of the 2 wk, there was no obstruction between the stalls, enabling the ponies to receive visual cues from each other. During the other week, a plywood partition (130 cm high; higher than the ponies) was placed between the two stalls, blocking visual but not olfactory or auditory contact. This was to determine whether visual contact affected behavior. One-half of the pairs were housed with the partition in place during the first week; the other half were first observed without the partition.

The activities that were recorded during the observation period consisted of:

1) Eating hay out of the trough. This began any time that hay in the trough was ingested, that is, taken into the mouth, chewed or swallowed.
2) Eating hay off the floor was recorded any time hay off the floor of the stall was ingested.
3) Drinking was noted from the time the pony's lips actually touched the water. Therefore, splashing water was also recorded as drinking.
4) Chewing was recorded each time a pony chewed, nibbled or mouthed anything other than hay or salt, such as the sawdust bedding in the stall, feces or the pipe rails.
5) Licking salt was recorded whenever a pony licked or chewed the salt block.
6) Walking or taking a step was recorded any time a pony moved two or more of its legs within a 3-s time period. When walking and eating occurred at the same time, walking was recorded in preference to eating.
7) Defecating was recorded from the time the pony lifted her tail to defecate until the tail was lowered.
8) Urinating was recorded during the time of urination.
9) Pushing hay was recorded each time a pony pushed hay with her muzzle. This occurred when hay was in the feed troughs and when it was on the floor. The ponies also pushed hay out of the trough.
10) Pawing hay. The ponies were sometimes observed to paw their hay by dragging a forelimb through it repeatedly.
11) Scratching or self-grooming occurred when a pony scratched herself using another part of her body such as her teeth, head or hindleg, or rubbed herself against an inanimate object. Rolling was also listed in this category.
12) Lying consisted of being either sternally or laterally recumbent.
13) Stand resting was noted whenever a

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pony was standing engaged in at least three of the five following behaviors:

i) hindlimb flexed,
ii) head lowered so poll (top of head) was lower than the height of the withers,
iii) eyes partly or fully closed,
iv) ears lying back in a relaxed position,
v) lower lip hanging relaxed.

14) Standing was recorded when a pony was standing, doing less than three of the behaviors necessary to be standing relaxed, but not standing attentively.
15) Stand alert consisted of ponies standing with their heads elevated, ears pricked forward and eyes focusing in the direction of the attraction.
16) Stretching neck over partition in an attempt to look into the adjacent stall sometimes occurred when the boards were placed between the stalls.

The activities were timed using a stopwatch. Behaviors recorded as events were:

1) Neighing.
2) Flehmen, where the upper lip was curled up exposing the teeth.
3) Headlifts. These were recorded when the pony was engaged in eating and drinking behaviors. They occurred when the pony lifted her head so that her poll was at the level of her withers or higher.

A microcomputer[5] was used to calculate the seconds/observation during which each activity occurred, separately for four conditions: morning with and without visual contact and evening with and without visual contact between the ponies. These figures were converted to mean percentages of the observation periods. Paired t-tests were used to compare the behavior of the ponies during the morning and evening and in the presence and absence of visual cues (Snedecor and Cochran, 1967). For example, the percentage of time spent eating by one pony with visual contact was compared with the time spent eating by the same pony without visual contact. Percentages were calculated to avoid confusion between fractions of minutes and seconds. The hourly frequency was determined for neighing, Flehmen and headlifts.

In order further to investigate social facilitation, a conditional time budget or windowing procedure was used in which the occurrence of all behaviors by one pony while the other pony was engaging in a specific behavior was calculated (Crowell-Davis, 1983). For example, if one pony ate for 20 min during which the other pony ate for 10 min, it was recorded as 50% simultaneous occurrence. The percentage simultaneous occurrence of an activity or concurrent activity by both ponies of a pair was compared in the presence (without partition) and absence (with partition) of visual cues using a paired t-test.

Results and Discussion

Social facilitation of feeding apparently occurred. The presence or absence of visual contact as well as the provision of fresh food affected the ponies' feeding behavior. Significantly less time was spent eating in the afternoon when visual contact was eliminated (73 ± 4 vs 60 ± 7%, paired t-tests, $P<.05$; table 1). Fresh hay supplied in the morning probably stimulated both ponies to eat maximally; but, by afternoon, feeding could be stimulated by the sight of another pony eating. This is verified by analysis of concurrent eating, that is, measuring the time one pony spent eating while the other pony was eating. There was a significant decrease in eating by one pony while the other pony of the pair was eating when visual contact was eliminated (68.5 ± 3.9 vs 78.9 ± 3.3%, $P<.05$). There was one major difference in the average time budgets of the ponies due to the presence of the partition: standing nonalert time increased from 6 ± 3% of the time when the ponies had visual contact to 12 ± 7% of the time when visual contact was prevented by the partition. Feeding and standing were the major behaviors; therefore, when standing increased in the absence of visual contact, feeding declined.

These results indicated that social facilitation of feeding depends, in part, on visual contact between the animals. The rate of simultaneous feeding fell when visual contact was eliminated despite continued auditory and olfactory contact.

The time budget of the ponies is given in table 2. Under these conditions in which hay was available ad libitum, the percentage time spent eating, 70%, is very similar to that ob-

[5] Apple Computer Inc., Cupertino, CA 95014.

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TABLE 1. THE EFFECT OF TIME OF DAY AND VISUAL CONTACT ON PERCENTAGE TIME SPENT EATING, STANDING AND WALKING[a]

Behavior	With visual contact		Without visual contact	
	Morning	Evening	Morning	Evening
Eating	76.0 ± 4.0	73.0 ± 3.9	70.7 ± 4.1	60.0 ± 6.5[b]
Standing	9.8 ± 2.3	19.1 ± 3.0	14.1 ± 5[c]	28.4 ± 6.5
Walking	3.2 ± .5	3.1 ± .5	2.5 ± .4[c]	2.8 ± .4

[a]All values are means ± SE.

[b]Less than evening with visual contact (P<.05), paired t-test.

[c]Different from morning with visual contact (P<.05), paired t-test.

served in feral and free ranging horses. For example, Salter and Hudson (1979) found that feral horses in Alberta spent 75% of the daylight hours grazing, and Duncan (1980) found that Camargue horses spent 59 to 63% of the 24-h period grazing. The differences probably reflect the availability and quality of forage, because both Duncan (1980) and Tyler (1972) have found that time spent eating increases in winter when forage is scarce and decreases in the summer when grass is abundant. It is surprising that the time budgets of the stalled ponies are as similar as they are to those of feral horses, given the environmental differences of the animals and the different observational techniques employed.

The ponies in this study spent 1.9% of their time drinking, or six bouts/h. This includes the data collected from one pony who was a prandial drinker; she took a mouthful of water with each bite of hay. When her data were excluded, the frequency fell to 2.5 bouts/h. Willard et al. (1977) found that stalled ponies spent 1.2% of their time drinking. The feral horses in western North America drink far less frequently because water is not easily available (Berger, 1977; Miller and Denniston, 1979). The occurrence of prandial drinking was not unexpected. Prandial drinking exaggerated to the point of psychogenic polydipsia has been noted as a behavioral problem of horses (Waring, 1983). The easy availability of water, especially from automatic waterers, may predispose to this behavior.

Walking occupied 2.9% of the time. This is considerably less than the 9% observed in Camargue horses by Duncan (1980), but is not surprising given that the ponies were limited by the confines of the stalls and were within a few strides of food and water at all times. Nevertheless, the amount of activity of a stalled horse must be considered when its nutritional requirements are calculated. Digestibility trials and measurements of metabolic rate are usually made in situations in which walking is precluded such as metabolism crates and straight stalls. Results are then applied to the more common environment of the brood mare or performing horse, the box stall.

Eliminatory behaviors were of considerable interest because Odberg and Francis-Smith (1977) have shown that horses will not eat grass

TABLE 2. THE MEAN PERCENTAGES OF EACH BEHAVIOR PER OBSERVATION PERIOD[a]

Behavior	Mean		SE
Eating, trough	28.9	±	13.8
Eating, floor	41.2	±	10.9
Total eating	70.1	±	8.6
Walking	2.9	±	1.2
Standing, rest	6.7	±	4.0
Standing	9.0	±	4.0
Standing alert	2.1	±	1.7
Total standing	17.8	±	7.4
Drinking	1.9	±	2.9
Defecating	.2	±	.3
Urinating	.06	±	.03
Chewing, nonfood	.06	±	.1
Licking salt	.06	±	.1
Pushing hay	5.2	±	7.0
Self-grooming	1.2	±	1.1
Lying	.6	±	.7
Stretching neck over partition	.07	±	.08
Pawing hay	.07	±	.1

[a]Percentages averaged across visual and no visual contact conditions.

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contaminated with feces. This behavior can also result in considerable wastage of hay in stalled horses. In the course of this study the ponies defecated 75 times/117 h or .2%. They moved away from the feeding area before defecating in 42% of the cases and moved away after defecating in 35% of the observations. Similarly, they walked after eating and before urinating in 44% of the cases and walked after urinating and before eating in 36% of the cases. This indicates that horses sometimes avoid contamination of their feed supply when space is available to do so.

Manipulating, but not eating, hay occupied over 5% of the ponies' time. The function of these behaviors, pushing hay with the muzzle and pawing, is not clear, but it may be a search for the most palatable parts of the food. Odberg (1973) has reviewed the theoretical causes of pawing, one of which is to uncover grass buried under snow. Pawing may also function as self stimulation to thwart boredom. Another cause of pawing may be a conflict situation between the drive to eat the highly palatable food and fear of losing visual contact with the environment.

Horses appear to use two methods to avoid predators while grazing: observation of other horses and nearby predators while the head is down, allowing a visual field of 360° (Coulter and Schmidt, 1984), and lifting the head to detect distant predators (Underwood, 1982). Berger (1977) used the rate of head lifting by horses while drinking as an index of nervousness. The ponies in this study lifted their heads frequently, 25 ± 11 headlifts/h, while eating or drinking.

Hay was always placed in the trough for the ponies, yet more time was spent eating hay from the floor (41 ± 11%) than from the trough (29 ± 14%). The ponies spent 5% of the time pushing the hay, the activity that, in part, represents pushing the hay out of the trough. These results indicate that ponies would prefer to eat from the floor. This reflects the normal grazing posture of the horse in which the visual field is wide. The pony may also avoid the situation in which it cannot see approaching predators; vigilance cannot be maintained when the animal puts its head into a trough or bucket and is unable to see. Both head lifting and pushing hay from the trough so that the horse can see while eating are probably residual antipredator behaviors.

Chewing nonfood objects occurred rarely, although wood chewing is a common stable vice (Waring, 1983). Provision of hay ad libitum may be responsible for the low incidence of wood chewing in this study because Willard et al. (1977) have shown that provision of roughage reduces wood chewing. Other factors that may have reduced the incidence of wood chewing in this study are the presence of wood shavings as bedding and the ability to interact with another pony during 1 of the 2 wk.

Stretching the neck in an attempt to look into the next stall was one behavior seen only when the partition separated the ponies. The behavior can be interpreted as an attempt to establish visual contact with the other pony. Neighs and Flehmens were rare events, occurring one/25 h and one/16 h, respectively.

In summary, these stalled pony mares in the presence of free choice hay spent the majority of their time eating but preferred to eat from the floor rather than from a trough or manger. They frequently interrupted feeding to lift their heads. When visual cues between them were eliminated, the ponies spent less time eating in the afternoon. They avoided contaminating hay with urine or feces, but not on all occasions. Measurement of 24-h intake will be necessary to determine whether providing visual contact between horses will lead to an increase in food intake and will prove useful in stimulating intake in racehorses and rapidly growing weanlings.

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