

## NIGHT-TIME BEHAVIOR OF STABLED AND PASTURED PERI-PARTURIENT PONIES

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### ABSTRACT

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Pregnant and lactating pony mares were observed in two environments, stable and pasture. Twenty-six pony mares were observed on pasture for 2 weeks before and after parturition. The behavior of each mare was recorded every 30 min from 18.00 to 06.00 h. The mutually exclusive behaviors were standing (either standing alert or standing at rest with a hindlimb flexed), grazing (prehending or masticating grass), walking, lying in sternal recumbency and lying in lateral recumbency. The total time-budget for pre-partum mares on pasture was  $55.3 \pm 4.1\%$  grazing,  $32.9 \pm 3.3\%$  standing,  $6.0 \pm 1.5\%$  lying in sternal recumbency,  $2.7 \pm 0.7\%$  walking and  $1.4 \pm 0.6\%$  lying in lateral recumbency. Grazing and standing occurred at all times, but grazing was most common from 18.00 to 21.00 h and after 05.00 h. Lying was most common between 01.00 and 04.00. Lying in lateral recumbency occurred only after dark, in pre-partum mares. The total time-budget for post-partum mares on pasture was  $68.6 \pm 4.0\%$  grazing,  $22.5 \pm 3.0\%$  standing,  $4.7 \pm 1.0\%$  walking,  $4.2 \pm 1.2\%$  lying in sternal recumbency and  $0.2 \pm 0.2\%$  lying in lateral recumbency. Lying in lateral recumbency was seen only at 18.00 h. Lying in sternal recumbency occurred between 21.00 and 04.30 h. More time was spent grazing by the post-partum mares than by the pre-partum mares.

The same behaviors were recorded for stabled pony mares except that eating hay rather than grazing constituted the ingestive behavior quantified. The total time-budget for pregnant stabled ponies was  $71 \pm 3\%$  standing,  $15 \pm 3\%$  eating,  $0.5 \pm 0\%$  lying in lateral recumbency,  $0.5 \pm 0.2\%$  walking and  $12.1 \pm 2.3\%$  lying in sternal recumbency. Eating decreased and standing increased during the night. Most lying was seen between 01.30 and 05.00 h. Lying in lateral recumbency occurred between 19.30 and 03.30 h. The total nocturnal time-budget of post-partum stalled ponies was  $67 \pm 3\%$  eating,  $19 \pm 3\%$  standing and  $13.0 \pm 2.3\%$  lying in sternal recumbency. Post-partum mares were not observed to walk or to lie in lateral recumbency.

The change in behavior after parturition may reflect: (1) nutritional demands of lactation; (2) maternal protective behavior; (3) response to seasonal changes in the environment.

## INTRODUCTION

Time-budgets of horses during daylight hours have been presented by Tyler (1972) and Salter and Hudson (1979). Duncan (1980) has presented 24-h time-budgets without separation into day and night. Keiper and Keenan (1980) have performed the only study of nocturnal behavior of free-ranging ponies. Ruckebusch (1972, 1975) has described the behavior and electroencephalograms of stalled and pastured ponies during the night. The object of this research was to determine whether confinement modifies horse behavior and whether the demands of lactation and gestation have differential effects on the foraging strategies of a grazing non-ruminant.

## METHODS

### *Pastured ponies*

Twenty-six grade Shetland-type ponies were maintained on a 5-acre pasture as a herd and then in two herds of 13 ponies on adjacent 8- and 10-acre pastures. The ponies had been on pasture for several months before observations began in May 1982. Supplemental grain was fed once a day and water was available at all times from a trough. Point samples were taken of the behavior of each pony every 30 min from 18.00 to 06.00 h on the nights of 17, 18 and 20–30 May, 1, 4, 8, 20–22 and 25–28 June and 10 July 1983.

The high, low and mean temperatures and rainfall were recorded at a weather station 2 km from the study site. The temperature varied from a low of 8°C to a high of 30°C.

The following mutually exclusive activities were recorded at 30-min point samples: standing (including standing alert and stand resting with a hindlimb flexed), grazing (prehending or masticating grass), walking, lying in sternal recumbency and lying in lateral recumbency. If the animal was standing and grazing it was scored as grazing. Because point samples were taken, a horse that was walking between bites of grass would be counted as walking. Sampling was interrupted to observe the mare's behavior at parturition; the results will be reported elsewhere. Each mare was identified by a freeze-brand on her rump and/or a plastic number-tag on a chain around her neck. A flashlight was used to identify the numbers during the darkest hours. Sunset was at approximately 20.30 h and sunrise at approximately 05.30 h during the study.

### *Stalled ponies*

Nineteen grade Shetland-type mares were kept in individual (2 × 3 m) box stalls in 1981. Nine of the mares were those observed in the pasture study of 1982. The stall partitions were 1.5 m high and prevented visual contact between the ponies. The ponies were fed hay and grain twice a day at 08.00

and 16.00 h. Point samples of each pony's behavior were taken as described above on 19 nights between 22 May and 10 July. In this study, eating indicated eating hay. The ponies remained in their stalls, except for a 1–3-h daily exercise period in a small paddock (11 × 17 m) from 09.00 to 12.00 h.

### *Statistical analysis*

A total of 2300 horse-nights were analyzed. A microcomputer (Apple II) was used to tabulate the data by days before and after parturition. Only data of mares within 2 weeks of parturition were used. The percentage of horses engaged in each activity at each half-hour was determined. Paired *t*-tests were used to compare the behaviors at each time of the 25 times in pre- and post-partum animals. On those dates when both pre- and post-partum animals were observed, the percentage time spent eating by the two groups were compared using a paired *t*-test. A Mann–Whitney *U*-test was used to compare the behavior of mares on the 5 nights preceding and the 5 nights following parturition. Six mares were observed on the 5th day before parturition, 4 on the 4th day, 2 on the 3rd day, 5 on the 2nd day and 4 on the day before parturition. Two mares were observed on the day after parturition, one on the 2nd day after parturition and 2 on the 3rd, 4th and 5th days. Correlation coefficients were calculated for percent time spent standing and day from parturition, for percent time in each behavior and temperature, and for percent time spent in each behavior and rainfall (amount).

## RESULTS

### *Pastured ponies*

The results are shown in Figs. 1–3. The predominant activity of pregnant ponies on pasture was grazing, and that of ponies in stalls was standing. The changes with time of day for pregnant ponies on pasture is seen in Fig. 1, and those for post-partum ponies on pasture is seen in Fig. 2. The percentage of time spent feeding decreases as darkness falls; at the same time the percentage of standing and lying increases. The greatest number of ponies were lying at 02.00–03.00 h, but at no time on a particular night were all of the ponies lying. As dawn approached, the number of horses grazing increased. When the behavior on pasture of pregnant ponies is compared with that of lactating ponies, the largest difference is in time spent grazing. The ponies spent more time grazing after parturition ( $68.6 \pm 4\%$ ) than before ( $55.3 \pm 4.1\%$ ; paired  $t = 4.27$ ,  $P < 0.001$ ), but comparison of pre- and post-partum behaviors on the same dates did not reveal a significant difference. The mean distribution of behavior on the 5 nights before and 5 nights after parturition is shown in Fig. 3. Lactating ponies spent  $69.6 \pm 3.5\%$  of the night grazing, whereas pregnant ponies spent  $57.6 \pm 2.5\%$  of the night grazing (Mann–Whitney  $U = 3$ ,  $P < 0.03$ ). None of the post-partum ponies assumed lateral recumbency.



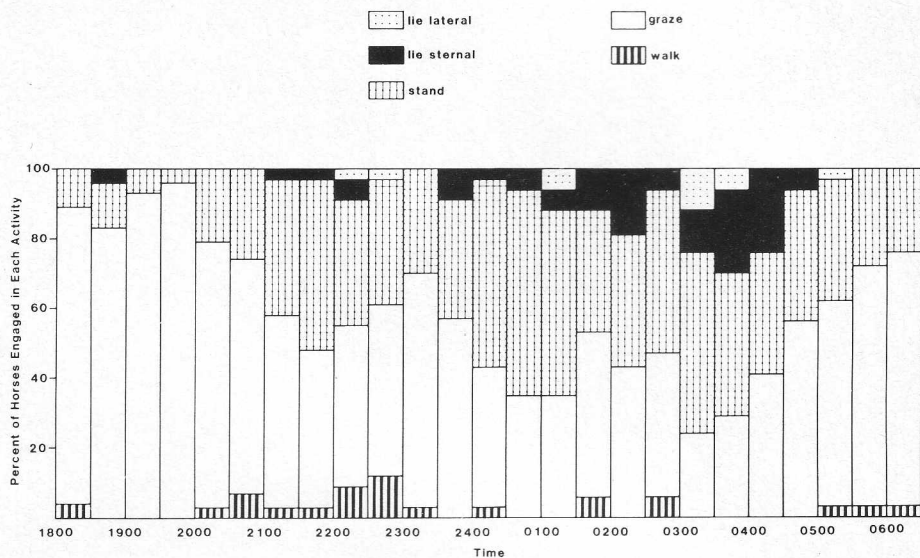


Fig. 1. Behavior of pregnant pony mares on pasture. The behavior of mares 1–14 days before foaling ( $x = 7.5$ ) was recorded every 30 min.

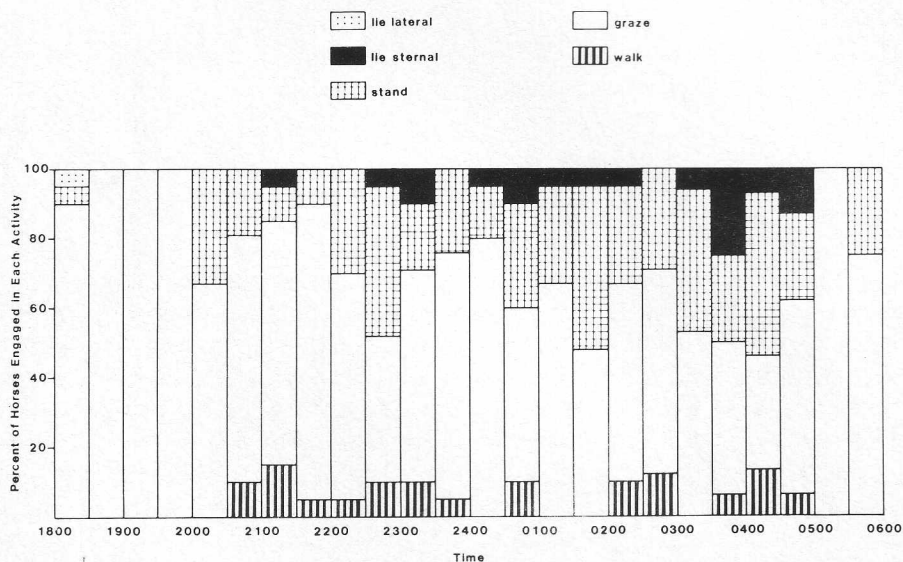


Fig. 2. Behavior of lactating pony mares on pasture. The behavior of mares 1–14 days after parturition ( $x = 7.5$ ) was recorded every 30 min.

There was no significant correlation between the temperature (minimum, maximum or mean) or amount of precipitation and percentage of time spent standing, lying, eating or walking.

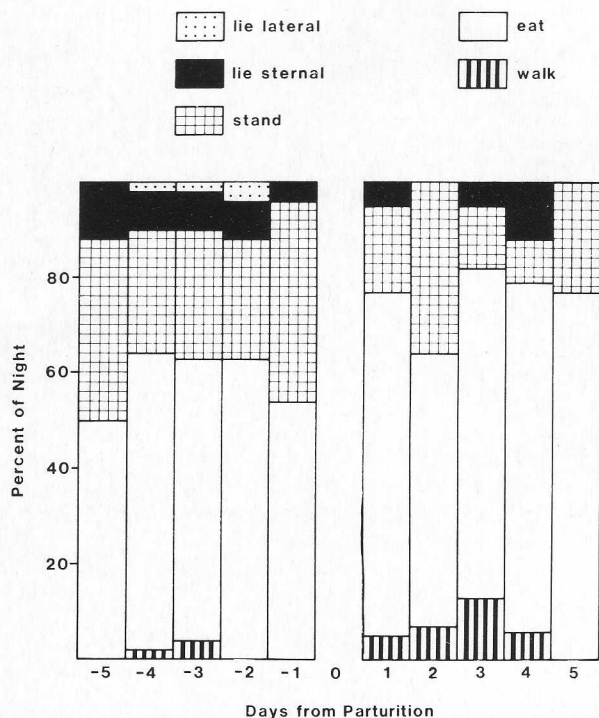


Fig. 3. The change in behavior of pony mares after foaling. The nightly mean behavior (18.00–06.00 h) of mares ( $n = 1-6$ ) for the 5 nights before and 5 nights after parturition.

### Stalled ponies

The behavior of pregnant and lactating mares in stalls is generally similar to that of ponies on pasture. The pre-partum behavior is shown in Fig. 4; the post-partum behavior is shown in Fig. 5. The majority of the time was spent standing pre-partum ( $71.3 \pm 2.6\%$ ) and eating post-partum ( $66.6 \pm 3.2\%$ ). The difference between time spent eating pre- and post-partum was significant ( $t = 9.77$ ,  $P < 0.001$ ). Most lying was seen at midnight. Equal time was spent lying by pre-partum ponies ( $12.8 \pm 2.2\%$ ) and post-partum ponies ( $13.0 \pm 2.0\%$ ), but none of the post-partum ponies assumed lateral recumbency.

Note that stalled ponies lay more and walked less than pastured ponies, both before and after parturition. The difference between time spent feeding pre-partum in stalls was significantly less than that on pasture ( $t = 12.23$ ,  $P < 0.001$ ), but there was no difference in time spent eating in post-partum ponies in the two environments. Standing time decreased as eating time increased; the majority of the night was spent in one of those two activities.

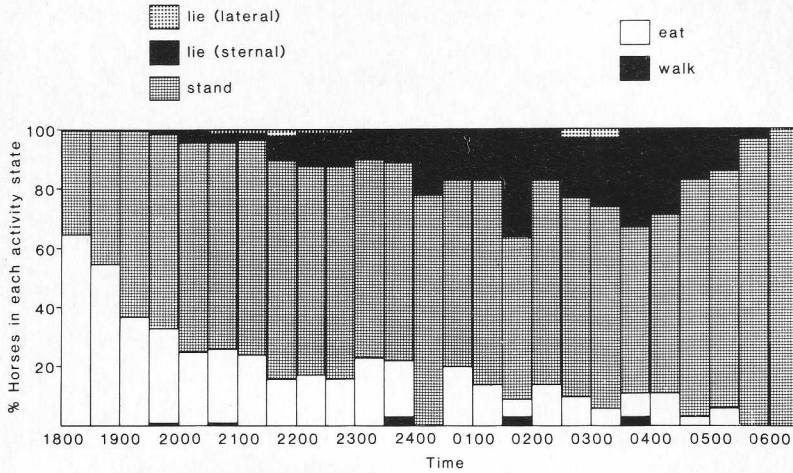


Fig. 4. Behavior of pregnant pony mares in stalls. The behavior of mares within 14 days of foaling was recorded every 30 min.

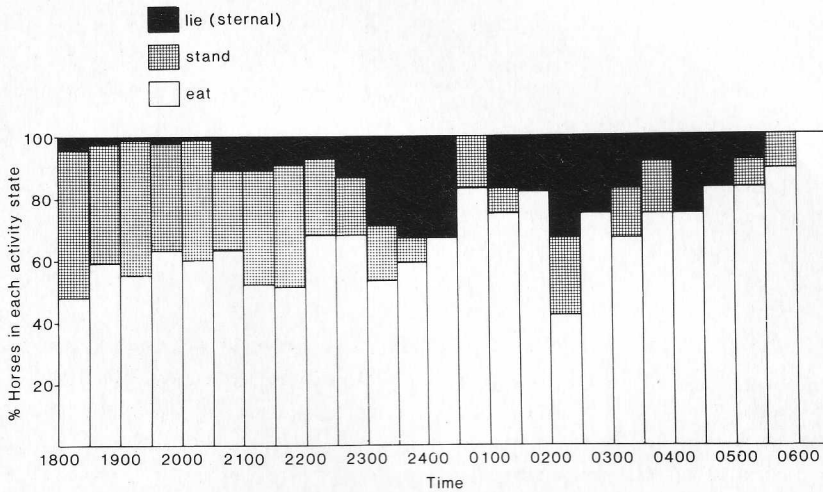


Fig. 5. Behavior of lactating pony mares in stalls. The behavior of mares 14 or fewer days after foaling was recorded every 30 min.

## DISCUSSION

There was an abrupt change in the pony's behavior after parturition. The amount of time spent feeding increased whether the pony was confined in a stall or free in a pasture. The observations of stalled ponies were confounded by provision of more hay after foaling, but the same change in behavior was observed on pasture where the availability of grass was the same before and after parturition. Apparently, horses respond promptly to the energy demand of lactation by increasing their food intake. The energy demand of

equine lactation is considerable; milk production in mares is equivalent to 3.1% of body weight (Ofstedal et al., 1983) or approximately 5000 Kcal/day.

The similarity of the behavior of pre- and post-partum ponies observed on the same dates has two possible explanations: (1) the behavior of the mares varies with the season and more mares were pre-partum in June than in July; (2) the increased grazing of the post-partum mares stimulated the pre-partum mares to graze. The latter supposition is supported by the finding of Sweeting et al. (1985) that social facilitation of feeding occurs in ponies, particularly those ponies in visual contact. The quality of the pasture changes with the season, and may have led to increased feeding time in mid-summer than in early summer. Temperature and rain did not seem to affect feeding behavior markedly, since there were no significant correlations.

The other changes in the mare's behavior post-partum, an increase in walking and decrease in lying in lateral recumbency, may be related to maternal defense of the foal. The mare in lateral recumbency is most apt to be in rapid-eye-movement sleep, in which the animal is unresponsive to environmental stimuli (Ruckebusch, 1975). While nursing a young foal, the mare may be more vigilant and therefore less likely to sleep. Walking may also be part of the vigilance or anti-predator avoidance. In addition to carnivorous predators, mares in the feral state would have to avoid stallions that may kill foals (Duncan, 1982) as well as other mares that will aggress against any foal other than their own that attempts to suckle.

The behavior of the mares in this study was generally similar to that of free-ranging horses (see Table I). The variations in time spent eating between populations may be due to difference in availability of feed or to observer techniques. For example, Berger (1977) observed at a water-hole, where there was probably less grazing and more drinking than if observations had been made elsewhere. Pastured ponies appear to budget their time as do free-ranging ones. Ruckebusch (1975) found that ponies tethered on pasture were recumbent for 24% of the night (10.00–08.00 h), and for 33% of the night while in tie-stalls. In an earlier report, Ruckebusch (1972) found stalled ponies to be recumbent for 19% of the night, but it was not clear whether the ponies in the earlier study were in tie- or box-stalls.

The most important finding in this study concerning horse management is the difference in time-budgets between pastured and stalled pre-partum ponies. The stalled pre-partum ponies spent much less time feeding than those on pasture (15 versus 55%) (see Figs. 1 and 4). The stall vices that horses develop (Ralston, 1982; Kiley-Worthington, 1983) may be a result of depriving the horse of the opportunity to graze. In the vacuum created, the horse may indulge in other oral activities such as cribbing or wood-chewing, or food-searching behavior such as pawing or stall-walking. Provision of hay *ad libitum* might significantly reduce the incidence of these vices (Hintz, 1983). Willard et al. (1977) found that horses fed hay spent 40% of their time eating, whereas those fed concentrates spent only 3% of their time eating. The ponies in this study, fed a limited amount of hay, spent more

TABLE I  
Percent time grazing by various populations of feral horses

Time of day (h)													Reference	Season	Population
06.00	08.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00	24.00	02.00	04.00				
98	95	33	85	70	80	80	81						Salter and Hudson, 1979	Winter	Western Alberta
100	65	45	90	70	80	92	80						Salter and Hudson, 1979	Summer	Western Alberta
80	77	83	83	75	72	75					70		Keiper, 1981	Summer	Chincoteague
						63	53	53	42	40			Keiper and Keenan, 1980	Summer	Chincoteague
						55-64							Duncan, 1980	Winter	Camargue
						51-60							Duncan, 1980	Summer	Camargue
						25-50							Berger, 1977	Summer	Grand Canyon
80	80	75	85	80	85	70	75	70					Rubenstein, 1981	Winter	Shackleford
70	70	60	55	50	60	65	65	60					Rubenstein, 1981	Summer	Shackleford



time eating than horses on a concentrate diet, but less than those fed hay in the Willard study.

In summary, ponies spend the majority of their time grazing when on pasture, and lactating mares spend more time grazing than pregnant mares. Consideration of the time-budgets of horses will result in more humane management.

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