

## Health and Welfare of Stabled PMU Mares Under Varied Water and Turnout Schedules: 1. Physiology

D. A. Freeman, DVM, PhD; N. F. Cymbaluk, DVM, MSc; Beth Kyle, MSc; H. C. Schott II, DVM, PhD; K. W. Hinchcliff, BVSc, PhD; and S. M. McDonnell, PhD

Clinical and biochemical measurements of hydration were not different among stabled pregnant mares provided water by continuous or three varied intermittent watering systems. Barn hygiene was unsatisfactory with continuous access to water. There were no differences or clinical abnormalities associated with daily, weekly, or biweekly turnout schedules. Authors' addresses: Dept. of Veterinary and Animal Sciences, Paige Laboratory, University of Massachusetts, Amherst, MA 01003-6410 (Freeman); Ayerst Organics, Brandon, Manitoba R7A 7H2, Canada (Cymbaluk and Kyle); Dept. of Large Animal Clinical Sciences, D-201 Veterinary Medical Center, Michigan State University, East Lansing, MI 48824-1314 (Schott); Dept. of Veterinary Clinical Sciences, 601 Vernon L. Tharp St., The Ohio State University, Columbus, OH 43210-1089 (Hinchcliff); and Section of Reproductive Studies, New Bolton Center, University of Pennsylvania, Kennett Square, PA 19348 (McDonnell). © 1998 AAEP.

### 1. Introduction

Two basic horse husbandry issues that require critical assessment are watering methods and exercise schedules, based on the public debate over welfare and the need for scientifically based husbandry guidelines. There is a lack of data on water delivery schedules, hydration, and welfare for stabled horses. Similarly, the duration and frequency of turnout needed by pregnant mares is not defined by previous studies.

As a way to address these issues, the health, clinical hydration, biochemical hydration, and hygiene were compared among mares provided water by continuous or three varied interval access sys-

tems. Physical and serum biochemical factors were compared among mares provided daily, weekly, or biweekly turnout.

### 2. Materials and Methods

The studies were conducted on a pregnant mare urine (PMU) ranch from November through March during 1995–1998. Mares were housed in a tie-stall barn at 5–10 °C and were 4–5 months pregnant at the start of each study.

#### A. Watering Method

In water study 1, mares were provided either continuous access to water or were given intermittent,

flip-lid access for 5 min three times daily. In water study 2, mares were provided either continuous access to water, intermittent access using a timer system, or intermittent access using a timer system with a float. The timer system provided a set water volume over 2 min, ten times daily. The timer-float system provided water for 5 min five times daily, allowed water replenishment during the watering period, and left a residual volume.

#### B. Turnout Frequency

Mares were housed in tie-stall barns that allowed sternal or lateral recumbency and both lateral and backward–forward movement. The mares were turned out for 3 h either daily, weekly, or biweekly (every 2 weeks). Paddocks were large enough to allow mares to canter.

### 3. Results

#### A. Watering Method

All mares remained in good health. There were no significant differences in water intake, urine output, or clinical hydration among mares provided continuous versus interval water. Serum cortisol concentrations were within normal ranges and did not differ among groups. Stall and mare hygiene were significantly worse ( $p < 0.05$ ) with continuous versus all interval water systems.

Serum osmolality (284.5 versus 283.5 mOsm), urine osmolality (1263 versus 1343 mOsm), urine specific gravity (1.051 versus 1.054) and plasma vasopressin (0.95 versus 0.93 pg/ml) were not different for mares provided water by continuous or interval-lid systems, respectively. Serum osmolality (284.5 versus 284 and 282.5 mOsm) and plasma vasopressin (0.83 versus 1.1 and 1.44 pg/ml) did not differ for mares provided water by continuous, timer, and timer-float systems, respectively. Urine osmolality (1329 versus 1469 and 1324 mOsm) and urine specific gravity (1.048 versus 1.051 and 1.048) were different ( $p < 0.05$ ) for mares provided water by continuous, timer, and timer-float systems. These differences, though statistically significant, were within normal ranges and were smaller than would be considered clinically relevant.

#### B. Turnout Frequency

Although weather conditions were occasionally severely cold (–40 °C), neither clinical disease nor signs of cold stress (shivering) during turnout were observed. Peripheral edema occurred primarily at the onset of the studies (13/48), declined within 2–3 weeks, and remained present in only a few horses (3/48). This stocking up was unrelated to turnout frequency. Ventral edema occurred intermittently in only three of 48 mares (two weekly mares and one biweekly mare) and was unresponsive to turnout. No differences were observed in serum muscle enzyme concentrations during the study.

### 4. Discussion

Average urine specific gravity values in this study are at the high end of normal reference ranges but are clinically normal based on the normal water intakes, serum osmolalities, urine osmolalities, and plasma vasopressin concentrations for all groups of mares. The data from both studies indicated normal hydration status and water balance in all cases.

While these data do not define optimal turnout requirements for pregnant mares, apparently specific frequencies are not critical. Movement available within tie stalls may provide the necessary activity to maintain physical health, and the interaction available between mares may satisfy social needs that are otherwise met during turnout. Turnout can be contraindicated because of weather extremes, such as cold, windy, or icy conditions. The appropriate turnout frequency for a pregnant mare is likely determined by a variety of management, health, and individual mare factors.

### 5. Conclusions

The clinical and biochemical hydration measures were within the normal range among mares on continuous and three intermittent watering systems. Each watering system in the study may provide sufficient water to mares, provided it is operated properly. No clinical or biochemical differences were associated with turnout frequency between mares. In particular, limb edema was not specifically associated with turnout.