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**Equine activity rhythms exhibit circadian and ultradian characteristics under different environmental conditions**

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Activity rhythms are regulated by the hypothalamic circadian pacemaker in response to daily changes in photoperiod. In some mammalian species, both circadian (~24 h) and ultradian (< 24 h) activity patterns are observed and are strongly influenced by environmental stimuli (1). Evidence to date suggests that horses housed in stabled conditions display diurnal (daytime) activity rhythms (2). However, this contrasts with observations of feral horse populations where ultradian activity bouts throughout the 24-hr cycle have been suggested (3). The true endogenous nature of a circadian rhythm can only be confirmed under constant conditions in the absence of time cues. This study determined the activity patterns of horses in their natural environment (Pasture) and under both a light/dark (LD) and constant dark (DD) stabled environment. Six mares of lightweight breed were fitted with Actiwatch-L (Respironics, Bend, OR) monitors (for measurement of activity and light intensity) and were maintained for successive 48-h periods at pasture, in individual stalls within a lightproof barn under LD, and finally in DD. Actiwatch data were used to create ClockLab (Actimetrics, Evanston, IL) compatible files. ClockLab’s batch analysis function was used to compute average activity counts/min for each mare in each treatment interval. A bout analysis function was used to quantify the ultradian structure of activity data identifying distinct bouts of high activity. Initial examination of the actigraphs revealed distinct ultradian activity patterns with a mean of 9 bouts/day (S.D.±3.1) One-way repeated measures ANOVA was used to analyse; average counts/min, activity bouts/day, average bout length and percentage of activity counts/light phase (subjective day in DD) across the three treatments (Pasture, LD, DD). Results reveal significantly higher activity counts/min at pasture compared to LD and DD (p<0.001). Mares at pasture demonstrated reduced bouts/day compared to LD and DD (p<0.001) and increased bout length compared to DD (p<0.01). However, mares demonstrated a greater percentage of activity within the light phase in DD compared to pasture and LD (p<0.001). In addition, cosine analysis (4) of the time series data identified a significant 24-h component of the activity rhythms with significantly increased robustness (goodness of fit values) associated with DD (p<0.05). In summary, mares display activity patterns that are weakly circadian and predominantly ultradian in nature. It is proposed that the DD condition, investigated in horses for the first time, permits greater unmasking of endogenous circadian periodicities in the absence of environmental stimuli such as social cues. Elucidating the nature of activity rhythms in the horse will have implications for future studies investigating diurnal variations in performance parameters in the equine athlete.