The use of GPS to measure feeding behaviour and activity patterns in the horse (*Equus caballus*)

H. Owen, C. Hall, S. Hallam, E. Smith
School of Animal, Rural and Environmental Sciences, Nottingham Trent University, Brackenhurst Campus

The global positioning system (GPS) has been used to record activity and monitor habitat use in many animal species. In the horse (*Equus caballus*) the monitoring of activity and feeding patterns has been used to assess the impact of environmental factors on behaviour and welfare. In free-ranging animals GPS can provide such information but the accuracy and reliability of these devices has yet to be confirmed. The aim of this study was: 1) to compare the results of visual observation with GPS recordings of the horse's head and neck position (head up (HU) and down (HD)) used to quantify time spent grazing; 2) to test the use of GPS collars to monitor activity patterns where distance, speed and location paths were recorded. In both studies two animals were fitted with Lotek GPS 3300S collars (with integrated GPS data logger and removable battery pack) round the top of the neck. In study 1 two horses were fitted with collars and turned loose into a 20x40m sand arena for 45 minutes. Feed balls and hay were provided (in nets and on the ground) to encourage movement and feeding behaviour for comparison using the two methods (observation from digital video recordings and GPS). HD was recorded by the GPS collars for a significantly longer time (interpreted as feeding/grazing time) than that recorded by observation ($p=0.004$). However when the visual observation was split into HU, HD and also head in mid-way position (HMW), where the nose of the horse was level or just above the chest, then no difference between the collar (HU and HD) and visual observation for (HU and HD+HMW) was found. It is likely that when in HMW the GPS collar may not be sufficiently angled to trigger the sensor to record HU or the collar may move on the neck. Conclusions relating to time spent feeding should be treated with caution. In study 2, the collars were fitted to two ponies with access to 2.02 hectares of lowland grazing. Activity (distance travelled and speed) and location was recorded for 2 days. The total distance travelled by the ponies in 24 hours (2.84km) and their average speed (4.04m/minute) was calculated and showed no significant difference between day and night. The total area was split into four equal segments and there was no significant difference in the time the ponies spent in each area although they were found to move at slower speeds and stand for longer in some areas. Movement paths could be identified by inputting the GPS collar data into ArcGIS and viewed on Google Maps. There was a high level of comparability observed between the two ponies confirming behavioural synchronicity. As in other species, the use of GPS collars to monitor the movement and location of horses/ponies was found to be effective, but data relating to head position did not provide a reliable means of recording the time spent feeding.

Key words: horse, GPS, activity, feeding behaviour, grazing

Corresponding author:
H. Owen
Tel: +44 1158485264
Fax:
E-mail: heather.owen@ntu.ac.uk