

Microhabitat and patch selection detection from GPS tracking collars of semi-free ranging Mashona cattle within a semi-arid environment

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Abstract

Over the last 30 years, the global positioning system (GPS) tracking collars have significantly enhanced livestock grazing behavior studies. Practices designed to understand and improve livestock grazing distribution can now be accurately and cost-effectively monitored with GPS tracking. The behavior and spatiotemporal microhabitat selection of Mashona cattle relative to the season in a semi-free-range grazing system was evaluated using a low-cost GPS herd activity monitoring (GPSHAM) collar. The GPSHAM automatically logged the position of the lead cow at 20-second intervals over a 7-hour daily grazing period. Additionally, the GPS data was complemented by visually observing the lead cow during daylight hours for nine successive days each in winter (July – August) and summer (February – March) of 2017. Summer and winter tracks were used to identify the Mashona cattle preferred grass species and hotspot areas by identifying the concentration of the GPS generated tracks and points ($n \geq 30$) in each grid and were used to calculate the distance from the water source using the shortest distance to the water point from the hotspot patch (HSP). The activities of the lead cow were recorded at five-minute fixed intervals for every 60 minutes in the morning (09:00 – 10:00 hrs), afternoon (13:00 – 14:00 hrs), and evening (16:00 – 17:00 hrs). The percentage of the observation time spent on an activity for the observed animal was calculated for the duration of the observation. Results showed a significant difference in patch selection ($p < 0.05$) between summer and winter with 17 HSPs being identified in summer and 8 HSPs in winter. Again, the range of Mashona cattle movement was 0 – 3 km from the water source. Seasonal activity patterns varied significantly across seasons. Therefore, Mashona cattle foraging behavior depends on seasonal variation. The landscape and animal attributes responded to paddock nutritional level dynamics with more frequent use of patches with higher plant species diversity and near the water source. Our research is useful to range managers, researchers, and cattle ranchers as a guideline for forage management of cattle preferred microhabitats, pasture, and nutrition.

