Potential of Accelerometers to Monitor Cattle Behavior and Welfare

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On extensive rangelands, cattle may not be able to be observed on a daily basis. The ability to remotely monitor livestock behavior and its relationship to animal welfare would reduce labor costs and potentially decrease time for managers to respond to potential animal welfare concerns. Failure of livestock water delivery systems is one of the most critical animal welfare concerns in arid and semi-arid rangeland pastures. Eight Corriente cows were fitted with GPS tracking collars and accelerometers for four weeks in a 1,090 ha pasture at the Deep Well Ranch near Prescott, Arizona. Cattle were tracked at two-minute intervals and movements were recorded at a frequency of 12 Hz by ear tag accelerometers. Cattle behavior was visually observed and recorded with video, and random forests procedures were used to analyze and predict animal behavior. Distance traveled was the most important variable for predicting behavior followed by side to side and fore and aft accelerometer movements. However, using only accelerometer data, mean movements of x, y and z axes, and motion intensity may not be appropriate metrics for accurately predicting multiple behaviors on rangelands. Variation of metrics and other combinations of metrics may be more effective. Simulated water delivery failure was evaluated on three occasions in June 2018. Panels were used to keep cattle away from the water drinker for four hours at mid-day. Cattle remained near the water tank and displayed aggressive behavior during the period when water was not available. Preliminary analyses suggest that simulated water failure may be able to be predicted by remotely collected data from GPS tracking collars and accelerometers, but more research is needed to validate initial results.