Husbandry of Free-Ranging Cows Using Virtual Fencing Concepts

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Introduction Virtual fencing is a method for managing free-ranging animals that melds electronics with animal behavior to accomplish animal control in lieu of conventional fences . Sensory cues , most commonly sound and electrical stimulation , have been used to warn an animal that it is approaching an invisible radio frequency (RF) boundary . Today RF signals emanating from satellites , such as those from the Global Positioning System (GPS) , replace the need for ground based RF signals . GPS can accurately and precisely determine an animal's location on the landscape , and when combined with a Geographic Information System (GIS) , it is possible to administer cues autonomously in a temporal and spatial format that produces repeatable low stress prescription animal management . Directional virtual fencing (DVF™) , previously described by Anderson (2001 ; 2007) , has been used successfully to hold and move free-ranging cattle across an arid rangeland landscape . The object of this study is to autonomously gather two groups of free-ranging beef cows into a corner corral containing the only source of drinking water from various locations in a 466 ha brush infested paddock between sunrise and sunset using only audio cues (Albright et al . , 1966) .

Material and methods Two treatments , each with ten mature crossbred *Bos tarus x Bos indicus* beef cows will be stratified into one of two prior handling treatments and evaluated for efficiency of autonomous gathering . The livestock in the treatment not currently being evaluated will be maintained in an adjacent paddock located approximately 1 .6 km north of the corral into which the autonomous gathering is conducted . Electronic devices designed and built by the Massachusetts Institute of Technology (MIT) , capable of recording an animal's spatial location using 1 Hz GPS technology as well as hardware and software for administering autonomous audio cues with wireless data transmission capabilities will be mounted on neck saddles attached to halters worn by the cattle . Background on each animal's temporal diurnal pattern of movement to the corral and trails used will be recorded during week one in the absence of any audio cues being administered . Once each day during the following two weeks , five morning and five afternoon autonomous gatherings will be randomly conducted outside the time interval cattle entered and exited the corral during week one . The treated group will consist of ten cows , previously habituated to being gathered into the corral from this paddock using human voice as well as sounds from a gas powered all-terrain vehicle (ATV) . Once these treated cows" reached the corral during habituation they were given immediate access to drinking water and a small amount of protein supplement . It was during one of these manual gatherings that all audio sounds were recorded . These recorded sounds will be autonomously played back to both the treated and control cattle in an attempt to move them to the corral in the absence of humans being present . The control cows had never been gathered from this paddock or any other using the audio being autonomously played , however , the cows were trained to wear electronic equipment and eat protein supplement .

Results and discussion Field notes , video and still pictures together with GPS data will be discussed especially in light of whether prior training is essential in order to optimize autonomous gathering of cows using audio cues .

Conclusions Data will confirm or refute that autonomously applied audio cues can be used successfully to gather free-ranging cattle without the need for humans to be present .

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