UNIVERSITY OF ALBERTA

Rangeland Research Institute

Habitat Selection by Commercial Beef Cows Grazing Heterogeneous Aspen Parkland Rangeland

Prepared by Sydney Lopes, Dr. Carolyn Fitzsimmons, Dr. Cameron Carlyle and Dr. Edward Bork

Cattle grazing on open-rangeland face complex decisions while foraging. This includes the habitats they are likely to select, which may vary from open habitats (grasslands) that are highly accessible, to relatively closed woodland habitats where forage is less accessible due to an abundance of shrubs and/or trees. In addition to accessibility, habitats have a marked impact on cattle distribution patterns due to differences in foraging opportunities (i.e., forage quantity and quality), the availability of water, and the provision of other benefits (e.g., shade during hot weather, protection during storms, etc.). As a result, technologies that facilitate the comprehensive tracking of cattle spatial geolocation in time are particularly useful, provided they do so at a high enough accuracy to facilitate habitat selection studies, and can be collected across many animals to enable genomic evaluation/selection of the herd.

In this study at the University of Alberta Kinsella Research Station, we are collecting detailed habitat selection data on free-ranging beef cows as they graze a typical Aspen Parkland landscape. These environments contain a diverse mix of habitats (open grassland, wetland meadows, aspen forests, and shrublands of wolf willow and snowberry that range from relatively open, to relatively closed) that vary widely in accessibility, and the quantity and quality of forage the provide. In the process, we are comparing three different technologies for their ability to track cattle geolocations. LOTEK Wireless GPS™ collars are being used on 40 cows to track their locations at 15 minute intervals during peak feeding periods (4-10 am; 4-10 pm), during both the summer (July-August) and fall (September-October) grazing periods. Drone technology is being used to prepare detailed habitat maps, with field sampling used to characterize habitat quality (access and foraging conditions). Resource selection functions will be developed to identify habitats that are preferred and avoided by cattle and assess how this reflects associated cattle production metrics (cow/calf weight gain, fall body condition, cow dietary composition and rumen microbial composition, as well as methane production).

Left: Cattle grazing with various technologies (GPS collars and multiple GPS eartags) allowing the assessment of habitat selection patterns at the Kinsella Research Ranch.

In order to facilitate the scaling of habitat selection across a larger number of animals, we are also testing the use of alternative technologies to track cattle geolocation over time. This includes light-weight ear-mounted global-positioning system (GPS) technologies (GPScollar AS™; CeresTag Pty Ltd™) that rely on solar gain to collect data on cattle positions in summer and fall. While these technologies are available for commercial application, they vary in utility (e.g., programmability), and are not yet proven for Western Canada where cold weather, short daylength, and challenging conditions (forests) are common. Our goal is to utilize low cost GPS technologies to supplement our high-resolution GPS collars in order to scale the habitat assessment of cattle to large numbers (200 head+), at which point we can then link our observed habitat selection functions for individual animals to genotypic data for these animals to detect potential markers for habitat selection.

Left: Different technologies being tested at Kinsella Research Ranch in 2022. Back: LOTEK GPS Collars™ (Canada); Front Left: GPS eartags from GPS Collars AS™ (Norway); Front Right: GPS eartags from CeresTag Pty Ltd™ (Australia).

Our short-term goal is to better understand those behaviors (habitat selection) that predispose a cow to be more productive (e.g., greater cow/calf weight gain and improved cow condition at weaning) while specifically grazing on native rangelands. Additionally, we seek to increase the availability and application of GPS technology for conducting animal-based production research on pasture. When successful, this will help provide new tools for beef producers to screen and select cattle better adapted to their specific foraging environments, so as to balance economic and environmental outcomes. For instance, having more reliable and low-cost access to cattle geolocation data for larger numbers of cattle may help us to better evaluate cattle for unique foraging environments. Producers grazing primarily forested rangeland may one day be able to select for cattle that prefer forested habitats without sacrificing cow/calf production. Alternatively, producers seeking to conserve wetland habitats may select for cattle with reduced use of wetland meadows.

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Contacts:

Sydney Lopes
Graduate Student
University of Alberta
goncalv1@ualberta.ca

Dr. Edward Bork
University of Alberta
Rangeland Research Institute
edward.bork@ualberta.ca