

Using GPS Technology and Genomic Testing to Provide a Better Estimation of Bull Power in a Rangeland Beef Operations

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Introduction

- There are multiple tools and technologies that can aid in helping producers match production goals with production resources.
- Bull Power has been a debated topic for many years with no organization willing to offer a specific bull to cow ratio.
- Bull power is variable in the intermountain west for a number of reasons
 - Large rangeland breeding pastures
 - Multiple bull breeding pastures
 - Mature bulls, acclimated bulls, young bulls
- GPS technology allows for a measure of bull movement and behavior during the breeding season
- Genomic parentage testing will allow for an actual measurement of how many calves were sired by a specific bull in a rangeland breeding setting

Factors Influencing Bull Power

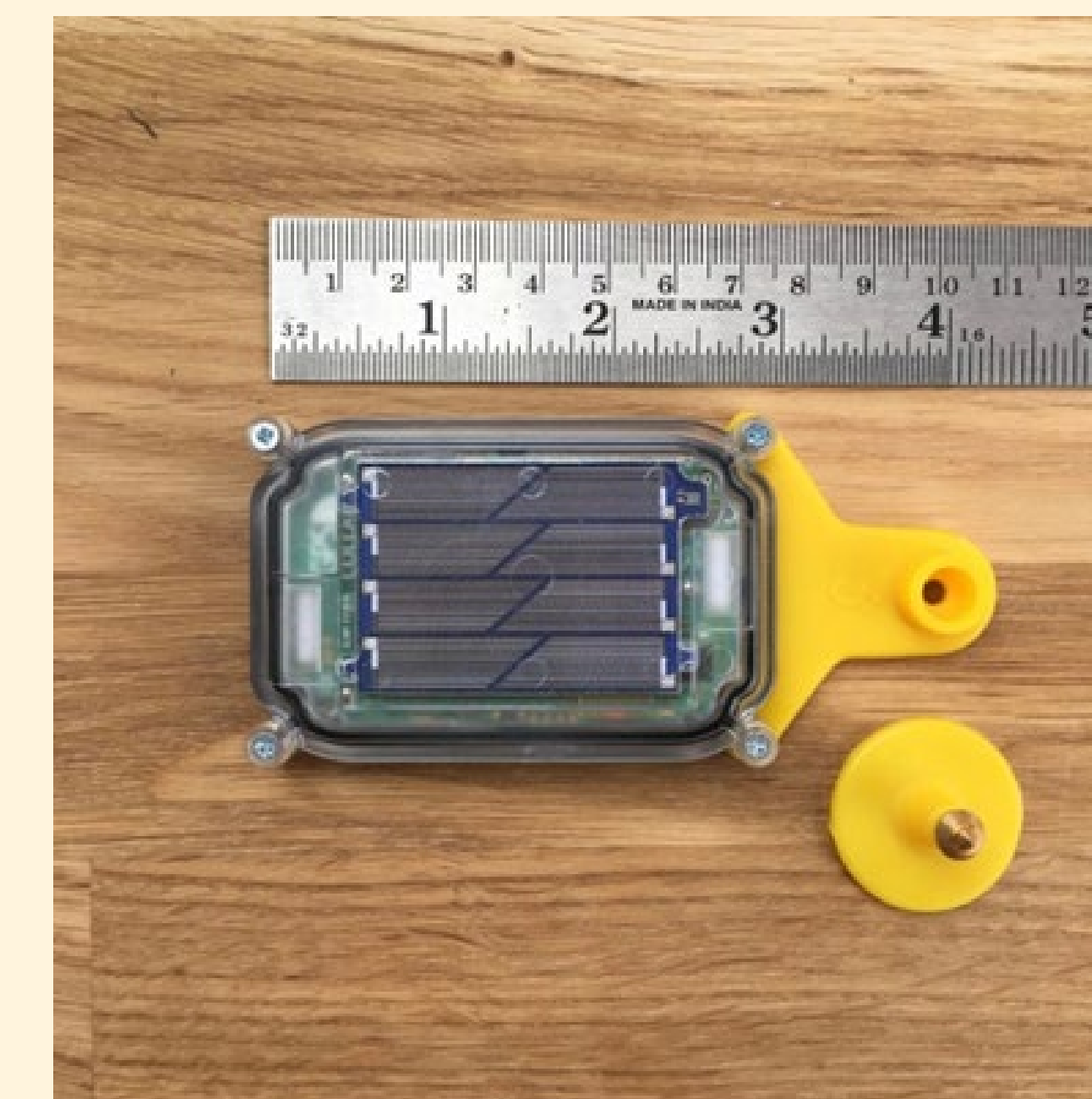
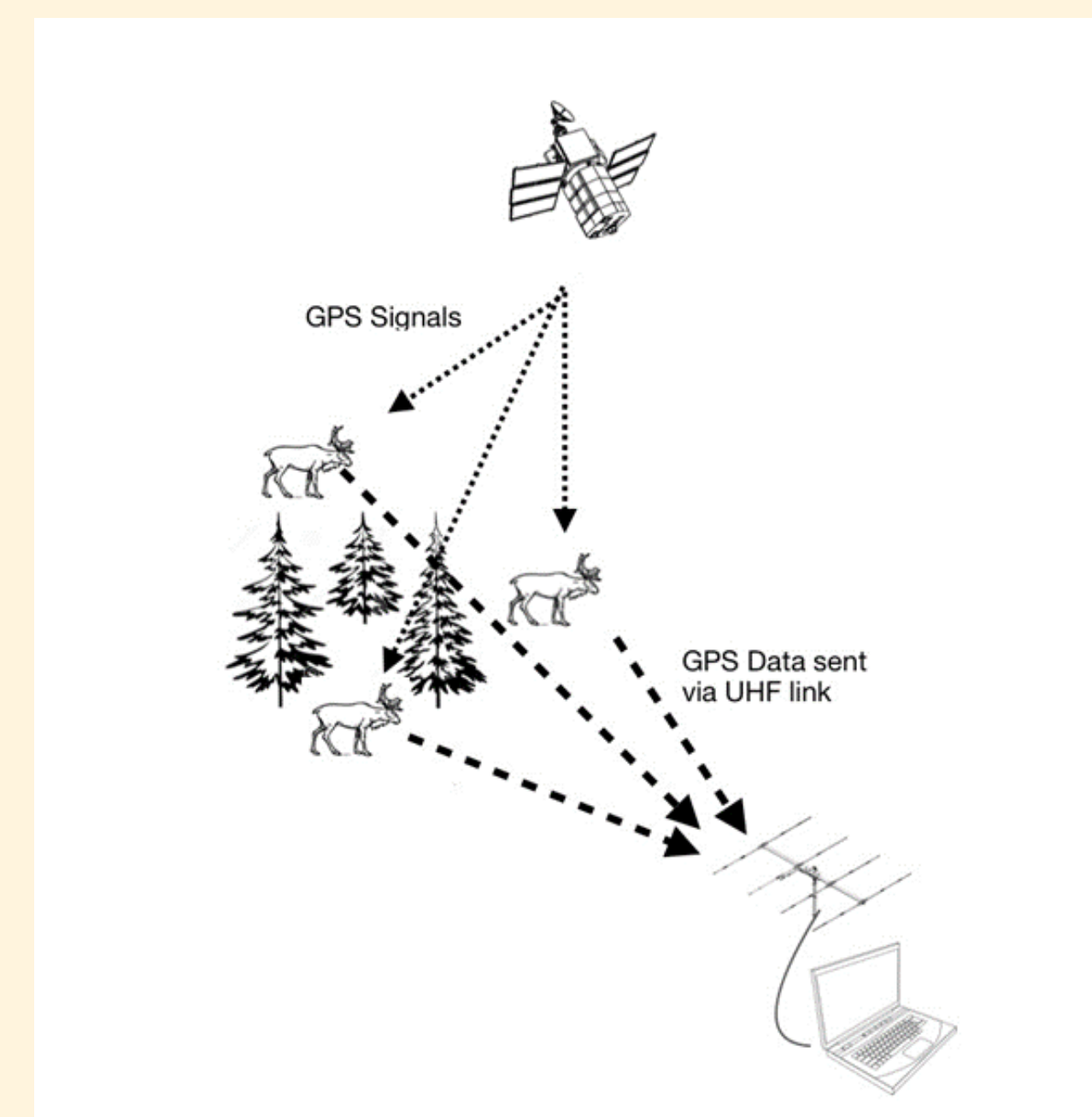
- Bull Age
- Libido
- Terrain
- Nutritional Status
- Dominance
- Reproductive Competency
- Environment
 - Breeding Program
 - Single breeding pasture
 - Multiple bull pasture
 - Size of pasture
- Opportunity



Objectives

1. The first objective of the current study was to evaluate the use of GPS technology and commercially available genomic testing (parentage testing) in various range environments to better estimate bull power
2. The second objective was to utilize the results of the current study to provide another tool to increase the accuracy of bull selection in range environments

Figure 1. Solar powered GPS ear tags utilized in the current study and their function



Materials and Methods

- A Population of 5 bulls were fitted with GPS collars and had a biological tissue sample collected for DNA extraction prior to breeding season
- Movement patterns were collected during an entire spring breeding season
- 104 Calves that were sired during this specific breeding season had an ear notch collected for DNA extraction when they were weaned the following year
- All samples had DNA extracted in the Rickords laboratory utilizing a saturated salt procedure described by Miller et al. 1998
- All DNA Samples were sent to Neogen corporation in Lincoln NE for parentage testing
- All female offspring were further evaluated by the iGenity beef commercial genomic test for future research and selection evaluation.

Results

- 4 bulls had movement data recorded for the entire breeding season
 - 1 collar lost
- One unknown bull sired a significant number of calves
- Parentage data represented in Table 1

Table 1. Parentage Test Results

Bull ID	Number of Calves Sired
Bull 1	30
Bull 2	16
Bull 3	14
Bull 4	10
Bull 5	2
Neighbors Bull	32

Conclusions

- Bulls did not adhere to the traditional 1:20 or 1:25 bull ratios
- Dominance, bull behavior, and activity need to be further evaluated in order to make accurate assessments of the current data
- The neighbors bull was the most productive bull in this particular breeding season
- The only reason the producer knew the bull was in their pasture was due to parentage testing
 - May provide a more accurate culling method
- While this tool may prove valuable, it is important to remember that it is only one tool and must be utilized with other selection tools and good management practices