

Using geospatial information technologies to identify factors affecting grazing distribution on grasslands

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Introduction The relationship between environmental and management factors and grazing livestock distribution is fundamental to understanding and improving grazing systems. With the advent of geospatial information technologies, global positioning systems (GPS) and geographic information systems (GIS) have been used to improve the efficiency and effectiveness of quantifying the distribution of livestock grazing in response to various independent variables (Bailey et al., 2001). The specific objective of this project was to develop a tool that enables managers and students to identify and study the effect of management and environmental factors on grazing livestock distribution.

Development of the tool Data for development of the tool were collected at the University of Nebraska's Barta Brothers Ranch, a 2,350 ha ranch in the eastern Nebraska Sandhills. Six cows (*Bos taurus*) were fitted with GPS collars and grazed freely with a herd of cow-calf pairs. Their locations were recorded at 5- to 10-minute intervals during two summer grazing periods in 2003. Following each period, the collars were removed and the data were transferred to a personal computer. A GIS software (GRASS) was the infrastructure used for data processing and analyses. A standard digital elevation model file of the ranch was imported into GRASS as the base topographical map. Software tools were used to create animations and present analyzed data in tables and graphs.

The tool The tool is a web-based, user-friendly, online system that enables the user to freely investigate the relationship between several independent variables (e.g., topographical position or livestock water location) and cattle distribution. The first feature of the tool is an animation of cow movement in a selected pasture and time period. When viewed on the screen, the cows appear as dots, fast forwarding their way over a three-dimensional image of the pasture (Figure 1). In analyzing the GPS data, users have numerous options and select the pasture, date(s), hours of the day, and the independent variable to be included in the analyses (Figure 2). Results of analyses are presented in tabular or graphical form allowing the user to view the relationship between grazing distribution and a selected environmental or management variable.

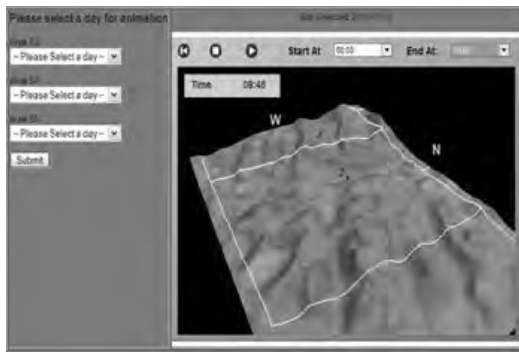


Figure 1 Screen capture of the three-dimensional animation representing the movement of the cows in a pasture for a selected time period



Figure 2 Screen from which users select date(s), hours of the day, and independent variable for analysis

Conclusions The tool demonstrates to users the environmental and management factors that affect grazing distribution. Livestock producers are intrigued by the technology and recognize the potential of GPS/GIS systems to enhance the management of grazing-based enterprises by aiding in selection of water sites and planning fencing.

References

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