HIGHLIGHTS

Rangeland Ecology & Management, January 2007

Integrated Ecological and Economic Analysis of Ranch Management Systems: An Example from South Central Florida

Hilary M. Swain, Patrick J. Bohlen, Kenneth L. Campbell, Laurent O. Lollis, and Alan D. Steinman

Developing sustainable cattle ranches requires integrated research that examines relationships among ecological and economic factors. We established an interdisciplinary experiment to examine the effects of cattle stocking density and pasture type on water quality, ecological factors, production and economics in ranchlands of south Florida. Lowering cattle stocking density had no effect on water quality, but decreased production and economic returns significantly. Management practices targeted at specific environmental factors on ranches need to consider economic impacts and the broader ecosystem implications of such practices.

Integrating Ranch Forage Production, Cattle Performance, and Economics in Ranch Management Systems for Southern Florida

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Developing sustainable cattle ranches requires integrated research that examines relationships among ecological and economic factors. The removal of cattle from grazing landscapes or decreasing stocking density is being investigated as one option to improve the quality of surface water. The objective of this study was to determine the effects of stocking rate on cow-calf performance, forage availability and quality, and ranch economic performance. Forage yield, utilization, and quality were not significantly affected by stocking rate. Production (kg weaned calves · ha^{-1}) was increased for high compared with medium and low stocking rates. Ranch revenues decreased one-for-one as stocking rates decreased.

Soil Phosphorus, Cattle Stocking Rates, and Water Quality in Subtropical Pastures in Florida, USA

John C. Capece, Kenneth L. Campbell, Patrick J. Bohlen, Donald A. Graetz, and Kenneth M. Portier

A large-scale research project, consisting of 8 improved summer and 8 semi-improved winter pastures, was established to investigate the influence of stocking rate on nutrient loads in surface runoff. Cattle stocking density did not influence nutrient loads, suggesting no benefit from reduced stocking density. Phosphorus loads were much greater from improved pastures than from semi-native pastures, indicating that the legacy of past fertilizer use could limit the ability of current best management practices to reduce phosphorus runoff. Reducing the overall volume of surface discharges would be a more effective strategy to reduce nonpoint runoff of P from cattle pastures in this region.

Effects of Cattle Stocking Rates on Nematode Communities in South Florida

Robert McSorley and George W. Tanner

Microscopic soil organisms such as nematodes are critical in maintaining healthy soils, but management practices can unintentionally disrupt these organisms. Nematode populations were monitored for several years in soils of subtropical Florida pastures that were subjected to different levels of cattle grazing. Cattle densities of up to twice those typically used in south Florida did not affect the kinds and numbers of nematodes present. Therefore managers could alter cattle densities without unintended impacts on nematodes involved in soil health and nutrient cycling.

Potential Outcomes and Consequence of a Proposed Grazing Permit Buyout Program

Mark S. Steinbach and Jack Ward Thomas

Public land grazing policies in the United States are under scrutiny for a variety of reasons, including impacts on ecosystem health and the relatively low cost of grazing permits. In response, legislation was introduced to purchase grazing permits from BLM and USFS permit holders. We assessed this potential policy change using a mixed-model research design, incorporating quantitative survey data and qualitative interview data to evaluate the impacts in the Rocky Mountain region. We described likely participation rates among permittees and uncovered potential impacts of the program.

This research was crucial for policy makers to make a better informed decision on a possible course of action regarding this legislation.

Utilizing Remote Sensing and GIS to Detect Prairie Dog Colonies

Timothy J. Assal and Jeffrey A. Lockwood

A large-scale monitoring effort of black-tailed prairie dog habitat is needed to assist scientists in determining the current extent and condition of the species. We mapped the locations of colonies in northeastern Wyoming, US, using three remote sensing methods: "raw" satellite imagery, "enhanced" satellite imagery (integrated with GIS data), and aerial reconnaissance (observations from a small plane). The enhanced satellite imagery provided the highest level of overall accuracy. Although it might not be adequate for all management considerations, these data can provide a coarse filter to identify large areas of contiguous habitat as well as habitat for other species.

Evaluation of Low-Moisture Blocks and Conventional Dry Mixes for Supplementing Minerals and Modifying Cattle Grazing Patterns

Derek W. Bailey and G. Robert Welling

During autumn and winter, rangeland cattle often require supplemental minerals, which can be self-fed in conventional dry mixes or in low-moisture blocks. Cattle visits to conventional dry mix feeders and low-moisture block supplements were evaluated using global positioning system tracking collars in moderate and high terrain and when cattle grazed rangeland or when they were fed hay. Cattle used low-moisture blocks more consistently than conventional dry mixes, especially when placed in high terrain away from water. Low-moisture blocks should be considered as a method to provide supplemental minerals to cattle if grazing distribution is a concern.

Diet Composition of Cattle Grazing Sandhills Range During Spring

Jerry D. Volesky, Walter H. Schacht, Patrick E. Reece, and Timothy J. Vaughn

Knowledge of the botanical composition and nutritive value of forage selected by cattle is critical for management decisions associated with supplementation programs, calving or weaning dates, and allocation of forage to different herbivores including wildlife. We conducted a study to determine diet composition of cattle when grazing upland Sandhills range during spring. Cows exhibited preference for current-year growth of cool-season graminoid species and were able to select diets that would meet nutrient requirements. However, grazing strategies would need to account for the limited availability of current-year growth, particularly April, to ensure cattle are meeting their nutrient needs.

Livestock Forage Conditioning Among Six Northern Great Basin Grasses

Dave Ganskopp, Lisa Aguilera, and Marty Vavra

Studies of Anderson and Scherzinger's forage conditioning hypothesis have generated mixed results. We researched late summer/early fall forage quality of 6 grasses grazed at vegetative, boot, and anthesis phenologies as well as ungrazed controls. Results suggested: 1) late season forage quality can be elevated by grazing but standing crop is reduced from 34 to 100%; 2) species responses varied with bluebunch wheatgrass and crested wheatgrass is harder to condition than other grasses; and 3) regrowth varied between years with more regrowth in drier than in wetter growing seasons. Findings will help managers elevate late season forage quality for livestock or wildlife.

Soil Water Content Dynamics Along a Range Condition Gradient in a Shortgrass Steppe

Eduardo Medina-Roldán, J. Tulio Arredondo Moreno, Edmundo García Moya, and F. Martín Huerta Martínez

Heavy grazing can induce subtle changes in species grassland composition that eventually affect ecosystem functioning. We examined soil water dynamics along a gradient of blue-grama (*Bouteloua gracilis*) cover. Sites with the largest blue-grama cover exhibited both fastest soil water recharge and soil water utilization. This response was explained by plant-specific traits at each community such as root biomass and plant cover rather than associated soil characteristics at each site. Our results suggest that functional thresholds in healthy semiarid grasslands move within narrow ranges of bluegrama cover. Generalization of our results would allow monitoring implementation of functional thresholds in grasslands.

Influence of 90 Years of Protection From Grazing on Plant and Soil Processes in the Subalpine of the Wasatch Plateau, USA

Richard A. Gill

Human communities in the Intermountain West depend heavily on subalpine rangelands to provide water for irrigation, forage for wildlife and livestock, and potentially sequester anthropogenic carbon. I evaluated the influence of 90 years of protection from grazing on the input, output, and storage of C in subalpine rangelands. Livestock grazing had no statistically significant impacts on total soil C or particulate organic matter, although grazing did increase active soil C and decrease soil moisture. Under predicted climate scenarios, the accumulation of easily decomposable organic material could lead to these soils becoming net sources of CO_2.

Seed Shatter Dates of Antelope Bitterbrush in Oregon

G. R. Johnson and Paul C. Berrang

Proper timing of seed collection is crucial when collecting seeds of antelope bitterbrush because the harvest period for a stand is typically less than a week. Seed shatter dates were examined for 192 sites in Oregon and surrounding states to determine how latitude, longitude and elevation affected seed shatter dates. The model developed will help determine proper timing for multiple-site collections. In general, moving north 1° latitude delayed shatter date by 6.7 days and moving up 100 m in elevation delayed shatter date 3.5 days.

Monoterpene Production in Redberry Juniper Foliage Following Fire

E. S. Campbell and C. A. Taylor, Jr.

Prescribed fire is commonly used to initiate redberry juniper (*Juniperus pinchotti* Sudw.) suppression, and herbivory by goats presents a potentially effective way to prolong the treatment. This study measured the monoterpene concentration and composition from redberry juniper foliage sampled from 3 different ages of plant tissue after fires. There was a trend in changes in composition of total oil as relative concentrations of monoterpene hydrocarbons decreased and monoterpene alcohols and oxygenated monoterpenes increased. This suggests a period of vulnerability in plant biochemical defenses which has the potential to be utilized by strategic herbivory by goats for more effective juniper management.

Brangus Cow–Calf Performance Under Two Stocking Levels on Chihuahuan Desert Rangeland

Milt Thomas, Jerry Hawkes, Godfrey Khumalo, and Jerry L. Holechek

Maintaining a core herd of well-adapted cows during short term droughts is a critical part of successful cattle ranching in arid areas. We compared cow–calf productivity on 2 lightly and 2 conservatively grazed pastures over a 5-year period in the Chihuahuan Desert of south-central New Mexico. Lightly grazed pastures yielded more calf weight per unit area than conservatively grazed pastures during a drought year due to destocking of conservatively grazed pastures to avoid excessive grazing use of primary forage plants. Our results suggest light grazing is a practical approach for Chihuahuan Desert cow–calf operators to avoid herd liquidation during short term drought periods.