HIGHLIGHTS

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When Art and Science Meet: Integrating Knowledge of French Herders with Science of Foraging Behavior

Fred Provenza and Michel Meuret

Scientists and managers have become increasingly isolated from one another in their attempts to understand and manage rangelands. We discuss convergence of the knowledge of skilled herders from France with the science of foraging behavior. We modeled insights herders gain through hands-on experience closely herding sheep and goats. Their practices are consistent with scientific studies that show the importance on nutrition, production, and health of plant biodiversity and forage sequencing within and among meals, as well as animal learning and culture over years. This knowledge is valuable for managing grazing on pastures and rangelands, with or without shepherds and dogs. ***Note: Provenza and Meuret explore this and related topics in greater depth in their new book "The Art & Science of Shepherding: Tapping the Wisdom of French Herders"*** http://www.acresusa.com/the-art-and-science-of-shepherding.

Mapping and Monitoring Cheatgrass Dieoff in Rangelands of the Northern Great Basin, USA

Stephen P. Boyte, Bruce K. Wylie, and Donald J. Major

The goal of this study was to identify cheatgrass (***Bromus tectorum***) dieoff in the Northern Great Basin shrub steppe. Cheatgrass dieoff represents a substantial reduction, or absence, of cheatgrass productivity during years of adequate precipitation in areas that had previously been occupied by this species. Cheatgrass is highly flammable; consequently, dieoff could be advantageous. However, cheatgrass dieoff causes accelerated soil erosion, loss of early spring food supply for livestock and wildlife, and the recovery pathways are unknown. Our analysis showed that dieoff can affect an area for a few years, and then cheatgrass can return, followed by another dieoff. Restoring dieoff areas may be advisable until land managers better understand the phenomenon.

Weather Affects Grasshopper Population Dynamics in a Continental Grassland over Annual and Decadal Periods

Jayne Jonas, William Wolesensky, and Anthony Joern

Better understanding of factors that influence grasshopper population dynamics will help forecast population outbreaks in time for managers to plan responses. Contributions of weather and grasshopper density to changes in densities and growth rates of common grasshopper species over 25 years are examined. Weather the year before hatching was important for explaining both densities and growth rates, as were large-scale atmospheric patterns. This study identifies the likely importance of temperature and precipitation to grasshopper dynamics through effects on host plant quality and the utility of long-term weather indices for forecasting densities and identifying critical years for grasshopper management.

Patch Burn Grazing Management in Semiarid Grassland: Consequences for Pronghorn, Plains Pricklypear and Wind Erosion

David Justin Augustine and Justin D. Derner

We examined interactive effects of fire and grazing (patch burn grazing management) on pronghorn antelope (***Antilocapra americana***), plains pricklypear (***Opuntia polyacantha***), and wind erosion in shortgrass steppe of Colorado. During winter, pronghorn density was 26 times greater on patch burns compared to unburned pastures, during which time pronghorn fed on burned pricklypear cladodes. Patch burns, and the subsequent response of pronghorn, reduced pricklypear density 54 – 71%. Wind erosion was greater on patch burns compared to unburned

pastures, but two orders of magnitude lower than on fallow cropland. Patch burns can be a valuable means to suppress plains pricklypear and thereby increase grass available for livestock in shortgrass steppe, without negative consequences for soil sustainability.

Stocking Rate and Grazing Season Modify Soil Respiration on the Loess Plateau, China

Junbo Chen, Fujiang Hou, Xianjiang Chen, Xiuli Wan, and James Millner

We studied the effect of grazing intensity on the carbon budget of rangeland on the Loess Plateau, China. Soil respiration, temperature, moisture and root biomass were measured in a mid-arid steppe with a 7-year history of zero, light, moderate and high sheep stocking rates. High stocking rates indirectly reduced soil respiration in summer grazed pasture by affecting soil moisture and above ground- and root biomass. Stocking rate had little effect on soil respiration of winter grazed pasture. Soil moisture had the greatest effect on soil respiration in the summer, while soil temperature had the greatest influence on soil respiration in winter.

Impacts of Different Grazing Rates on Canopy Structure and Species Composition in Hulunber Meadow Steppe

Xiaoping Xin, Ruirui Yan, Yuchun Yan, Xu Wang, Baohui Zhang, Guixia Yang, Shimin Liu, Yu Deng, Linhao Li

We examined the impacts of cattle stocking rate on plant species composition, canopy structural traits, standing biomass, and plant species diversity on northeastern China's Hulunber grasslands. Increased grazing intensity and duration decreased perennial grasses, and increased forbs and annual grasses. Increased stocking rates decreased canopy height, coverage and standing biomass. Species richness and canopy coverage were highest at the intermediate grazing rate. Monitoring species composition, canopy traits, and standing biomass are valuable to assess and adjust grazing management of these grasslands to sustain long-term productivity.

Fire and Nitrogen Alter Axillary Bud Number and Activity in Purple Threeawn

Morgan L. Russell and Lance T. Vermeire

Perennial grass bud banks are the source of most tiller growth, so we tested fire and nitrogen addition effects on purple threeawn (***Aristida purpurea***) buds. Fire reduced active buds through direct bud mortality, whereas nitrogen addition increased active buds at tiller and plant levels. Fire effectively controlled purple threeawn through bud bank reduction and nitrogen stimulated bud production of surviving burned plants. Interaction of fire and nitrogen indicates effects on total buds were conditional in that only burned plants responded to nitrogen, suggesting potential for using targeted nitrogen application to increase bud banks and hasten post-fire recovery of fire-sensitive bunchgrasses.

Aboveground Vegetation and Perennial Grass Seed Bank in Arid Rangelands Disturbed by Grazing

Mœnica Beatriz Bertiller and AnalÚa Lorena Carrera

We assessed the influence of aboveground vegetation on the density and spatial patterning of perennial grass seeds in litter patches in arid rangelands of the Patagonian Monte. Perennial grass seeds in litter patches did not vary with total plant cover or litter patch attributes at microsites with a shrub-grass canopy. In areas of bare soil or sparse vegetation, grass seeds in litter patches decreased with decreasing total plant cover. Regeneration and restoration of perennial grass cover in areas with bare soil or sparse vegetation requires management that increases perennial grass seeds banks. This includes artificial seed addition or seasonal reductions in stocking rates.

Stand Persistence and Forage Yield of 11 Alfalfa (Medicago sativa) Populations in Semiarid Rangeland

Christopher G. Misar, Lan Xu, Roger N. Gates, Arvid Boe, and Patricia S. Johnson

Demand exists for alfalfa that can persist in semiarid grazing lands. Eleven alfalfa populations, representing diverse germplasm, were evaluated with and without grazing. Locally adapted ***falcata***-based alfalfas exhibited greater persistence and forage yield under grazing than ***sativa*** hay-type and ***sativa*** pasture-type alfalfas. ***Falcata***-based alfalfas that persist under grazing and unfavorable environmental conditions (e.g., drought and harsh winters) have great potential for use in semiarid grazing lands.

Tourism Impacts on Indigenous Pastoral Communities in China

Mingming Fan, Wenjun Li, Guohong Wei, and Fang Luo

We studied whether tourism in pastoral areas can reduce rangeland pressure and improve indigenous peoples' livelihood in 12 grassland provinces of China, Inner Mongolia and Xinjiang. Tourism can seasonally increase pastoralist household incomes. However, businesses from outside the pastoral area may displace local herders who then only receive money through pasture rent or as laborers. Many pastoralists lack the training to perform better-paid roles. Tourism that replaces pastoralism does not necessarily protect the rangeland. It brings environmental impacts and disrupts traditional use to which rangeland are better adapted. Tourism managed by local pastoralist operators should become the main direction for economic development.

Fecal-FT-NIRS as a Non-invasive Tool for Assessing Diet Quality of Mediterranean Deer

Maria Ṣierra Tellado, Rafael Orpez, JoaquÚn Muþoz-Cobo, and Concepciœn Azorit

The NIRS technique appears as a suitable non-invasive tool to assess diet quality of Mediterranean deer. Spectra from the feces were related with rumen conventional chemical analysis through chemometric regression. We develop and validate a Fourier transform near-infrared diffuse reflectance spectroscopy methodology on feces (Fecal-FT-NIRS) of red- (***Cervus elaphus hispanicus***) and fallow deer (***Dama dama***) for the determination of acid detergent fiber, neutral detergent fiber, lignin, carbon to nitrogen ratio, and enzymatic digestibility of organic matter. This method overcomes barriers of direct fecal analysis to monitor diet quality in free living-deer.

Cattle Responses to a Type of Virtual Fence

Christina Umstatter, Justin Morgan-Davies, and Tony Waterhouse

A type of virtual fence system is now commercially available for cattle. It consists of cow collars, a transformer and an induction cable. We set out to test this novel system on 10 cows using GPS collars to pinpoint location, and activity sensors to gather behavioral data. The system successfully deterred the animals from crossing the virtual fence line and there were no indications of behavioral changes that could indicate animal welfare problems. Virtual fencing could provide a worthwhile solution for farming and nature conservation management where physical fences are not preferred or labor costs need to be reduced.

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