



Managing for Ecosystem Services: Research Base and New Directions for Range Science

Justin Derner



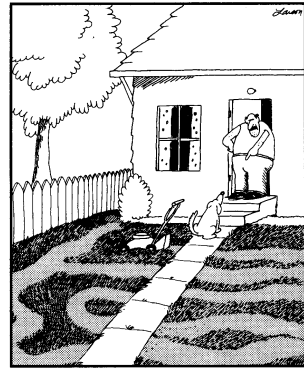
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The Far Side®



Parallel to
Range Science
Research?

"You call that mowin' the lawn? ... Bad dog! ...
No biscuit! ... Bad dog!"

Road Map

Research Base

- Production focus
- Literature synthesis



New Directions

- Ecosystem services and tradeoffs
- Ongoing efforts


Research Base



Research Focus: 20th Century


Forage production

- Range improvements
- Brush removal
- Introduced species



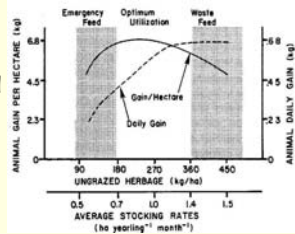
Livestock production

- Weight gain
- Genetics



Management Practices: 20th Century

Emphasis on proper stocking rates with associated facilitating practices (fence, water) for forage and livestock production



Uniform use of vegetation within and across pastures

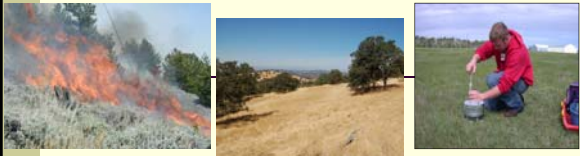
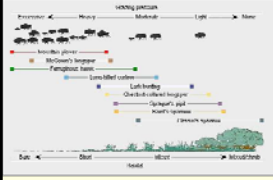

Bement 1969

Literature Synthesis

- Grazing
- Brush Management
- Planting
- Fire
- Riparian Management
- Wildlife
- Landscape Approach
- Social-economics



New Directions for Range Science

Knopf 1996

Management Practices: 21st Century The Production-Conservation Interface

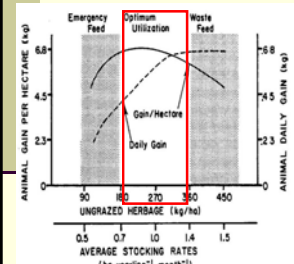
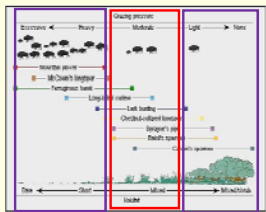
Provision of multiple ecosystem goods and services

Species of concern and habitat considerations



An Example of New Directions: Research in the Great Plains

Management Paradigm → Conservation Concern





Bement 1969

Knopf 1996

Grassland Bird Emphasis Mountain Plover (*Charadrius montanus*)

Needs short vegetation structure and substantial amount of bare ground for nesting




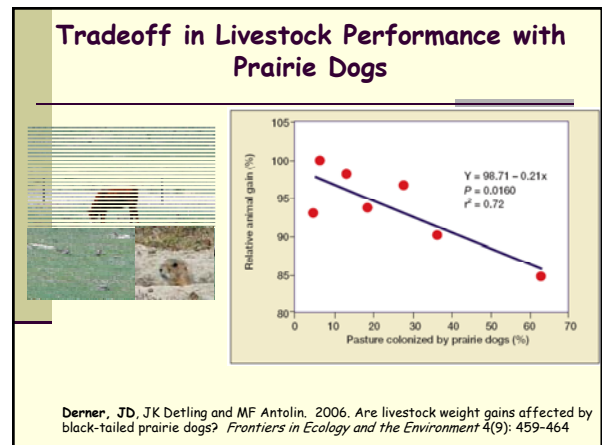
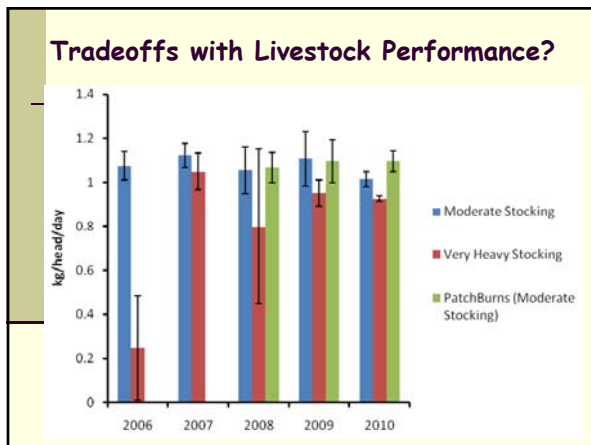
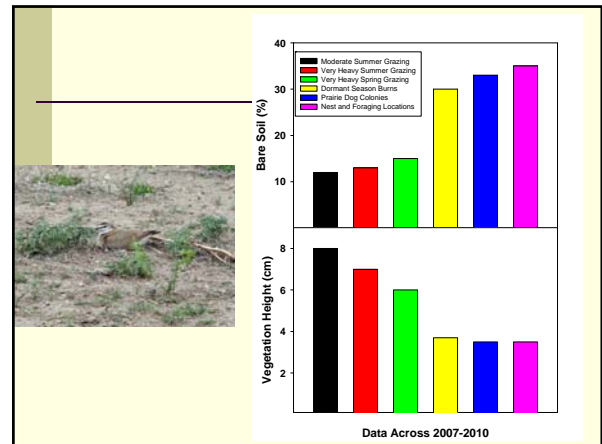
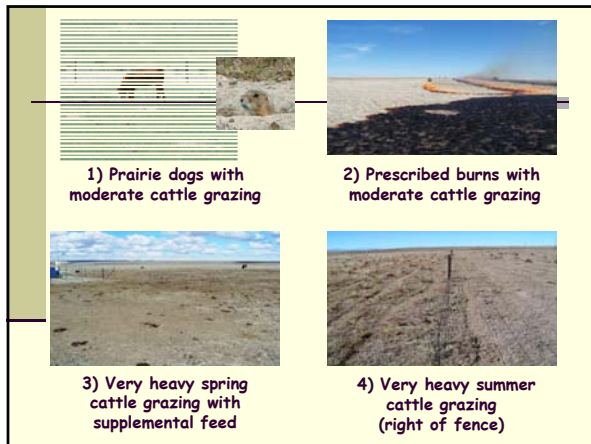
Characterizing Nesting/Foraging Habitat Conditions

106 Sites (61 nests, 45 foraging locations)

Bare Soil Exposure: Mean + 95% CI = 35 ± 3%

Vegetation Height: Mean + 95% CI = 3.7 ± 0.2 cm





Economic Tradeoffs of Livestock Gain

(Relative to moderate stocking rates on a per yearling steer basis)

Prairie dogs ¹		Prescribed burning		Very heavy spring		Very heavy summer	
20% occupation	60% occupation	ADG	\$	ADG	\$	ADG	\$
-5.5%	-19.69	-14.0%	-50.13	0	0	-92.4%	*
						-25.7%	-92.02

ADG: average daily gains (pounds/head/day) of yearling steers
 \$: dollars of summer (May 10-Oct 1) weight gain, assuming \$1/pound selling price

¹From Derner et al. 2006
 * Different season of grazing, also costs of supplemental feed tubs for spring grazing

- ### Summary of Production-Conservation Tradeoffs
- Prescribed burns**
 - Provides suitable habitat conditions
 - Implementation costs for burning
 - No negative effects on livestock weight gain
 - Prairie dogs**
 - Provides suitable habitat conditions
 - Loss of forage quantity > increase in forage quality
 - Reduced livestock weight gains
 - Very heavy summer grazing**
 - Does not provide suitable habitat conditions
 - Reduced livestock weight gains
 - Long-term vegetation change?
 - Very heavy spring grazing**
 - Does not provide suitable habitat conditions
 - Substantially reduced livestock weight gains
 - High costs of supplemental feed


Adaptive Grazing Management Studies in CA, WY and CO for Multiple Ecosystem Services

Survey Efforts

CA survey
- Lubell presentation on key findings


WY survey
- Just sent out

Both will have on-ranch visits



Large-scale Adaptive Grazing Management Experiments in 2013

For both CA and CO experiments, advisory group representing diverse interests determines adaptive nature of grazing practices (in comparison to traditional practices) for provision of multiple ecosystem goods and services



- Summary Points**
- Strong foundation base of knowledge
 - Conservation-Production interface is the reality of 21st century management of rangelands, and this necessitates provision of multiple ecosystem goods and services
 - Open frontier of research to address adaptive management for ecosystem goods and services using participatory input



Questions?

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