

CEAP: Prescribed Grazing

- > JD Derner, ARS, High Plains Grassland Stat.
 - Plant and livestock production
- > DM Milchunas, FRWS, Colorado State Univ.
 - Game and non-game wildlife
- > KW Tate, Plant Sciences, UC-Davis
 - Soil surface hydrology
- DD Briske, ESSM, Texas A&M University
 - Plant response and grazing patterns



Writing Team Approach

- Considered anticipated benefits of NRCS Conservation Practice Guidelines hypotheses
- > Evaluated benefits against experimental data
 - Many strongly supported
 - Some strongly refuted
 - Others equivocal or uninvestigated
- Vet experimental data with experiential information in the next step
- Improve conservation practice planning and assessment



Presumed Practice Benefits

- Managing harvest of vegetation with animals
- Improve or maintain these ecosystem components:
 - Desired species composition and plant vigor
 - Forage quantity and quality for herbivores
 - Surface and subsurface water quality and quantity
 - Soil condition and conservation
 - Quantity and quality of wildlife habitat



Information Evaluated

- > Extant literature is narrowly focused
- Stocking rate and grazing systems
 - Vegetation production
 - Livestock production
 - Soil surface hydrology
 - Wildlife
 - Knowledge gaps; experimental limitations
 - Broad recommendations



Plant & Animal Production - SR

- Stocking rate is a major determinant of vegetation and animal production.
- Plant biomass exhibits stronger relationship with stocking rate than plant cover.
- Consistent tradeoff between animal production and increasing stocking rate.
- Soil organic carbon largely unaffected by stocking rate
 - More apparent in grazed vs ungrazed



Tiller Defoliation Pattern - SR

- Defoliation frequency increases with stocking rate (8 of 9 studies)
- Defoliation intensity increases with stocking rate, but not proportionately to frequency (4 of 5 studies)





Plant Defoliation Response

- Seasonal effects: midseason (culm elongation)late season > early season (vegetative) (6 of 9 studies)
- Growth suppressed by increasing frequency and intensity of defoliation at any stage (5 of 6 studies)
- ➤ Eight of 12 studies defoliation height < 6 cm
- Questionable application to real systems

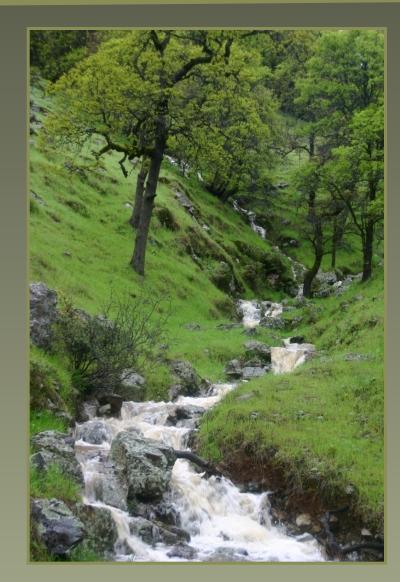
Forage Quality

- ➤ Stocking rate
 - FQ < with SR in all 4 studies
 - FQ < with grazing time in all 3 studies
- Grazing systems
 - CG > RG in 3 of 4 studies
- Grass quality
 - DMD: 40 66% (n = 27)
 - CP: 5 15% (n = 28)
 - C3 grasses higher FQ than C4



Soil Surface Hydrology - SR

- Stocking rate is a major determinate of hydrological function
- Hydrological function decreases with increasing stocking rate





Wildlife - SR

- > Few studies conducted with multiple SR (10)
- ➤ Bird and small mammal responses both increase and decrease with SR
 - Bird diversity

 SR, total abundance unclear
- Impact on vegetation structure > food sources
- Livestock diet overlap greatest with elk than deer or pronghorn antelope



Plant & Animal Production - GS

- Primary Production
 - CG ≥ RG 87% (20/23 investigations)
- Secondary Production
 - CG > RG 92% (35/38 investigations) per head production
 - CG > RG 84% (27/32 investigations) per area production
- ➤ GS does not influence <u>ecological function</u> of grazed ecosystems



Realistic Experimentation

- > Attributes of most effective studies:
 - Duration: 10 studies > 10 yrs
 - Pasture size: 5 studies > 100 ha
 - Pasture number: 9 studies > 8
- Strong ecological inferences, but adaptive management removed.



Tiller Defoliation Pattern - GS

- ▶ Defoliation frequency: CG ≥ RG in 3 studies; CG < RG in 1 study</p>
- Intensity: CG = RG in 2 studies; CG < RG in 1 study</p>
- Agrees with international literature (Gammon and Roberts 1978)
- ➤ Small scale experiments; RG pastures < 1 ha in 3 of 4 studies



Defoliation Uniformity vs Frequency

- Multiple defoliations recorded in single grazing cycle; (9 of 10 studies)
- ➤ 80% ≥ tiller defoliation has been recorded in majority of studies
- Regrazing occurs early in grazing cycle; (4 of 6 studies support)
- Questions assumption of high tiller utilization with only one defoliation per grazing cycle



Soil Surface Hydrology - GS

- Grazing system does not ameliorate negative consequences of increasing stocking rate.
- ➤ At moderate stocking, 3 studies show RG > CG and three show RG = CG.
- Range condition or state change required to improve hydrologic function.



Wildlife - GS

- > Results over all wildlife groups
 - CG ≥ RG in 25 or 30 studies
 - Sharp-tailed grouse (n=5)
 - Ducking nesting (n=3)
 - Deer use (CG > GR in 10/13 studies)
 - Sage grouse (no valid comparisons)
- Ranch operations not well represented
 - Refuges, wildlife management areas



Knowledge Gaps

- > Assessment of ecosystem <u>functions and services</u>
 - biodiversity, C sequestration, functional groups.
- Contribution of adaptive management decisions
 - human decisions, goals and values
- Recovery and conservation strategies
 - Season and length of deferment
- Larger scale responses
 - watersheds, landscapes, entire ranches



Recommendations

- Stocking rate requires greater emphasis
 - drought management, forage inventory
- Rotational grazing requires reevaluation
 - assumptions unsupported; data needed
 - Symposia Wed am and Thursday am
- Monitor efficacy of conservation practices
 - beyond implementation phase
- Practice implementation vs ecosystem management and conservation
- Management-research linkages need to be strengthened