LONG-TERM EFFECTS OF YEARLONG AND SEASONAL ROTATION GRAZING ON THE SPATIAL HOMOGENEITY OF GRASS.

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INTRODUCTION

- Greater livestock densities during grazing periods in seasonal rotation grazing systems should create more uniform spatial distribution of forage utilization and grass abundance than continuous yearlong grazing.
- This is expected because the greater livestock density will force animals to seek all forage sources, and not express selection for particular species and foraging locations.
- We assume that these differences in the spatial distribution will be represented by the skew (departure from normal distribution) of a population of measurements within a pasture.
- Therefore, we expect less skew in the distribution of measurements under seasonal rotation grazing.

OBJECTIVE

- To compare the skew of grass abundance within pastures grazed under continuous yearlong (YL) and seasonal rotation (SR) over 22 years (1984-2006).

METHODS

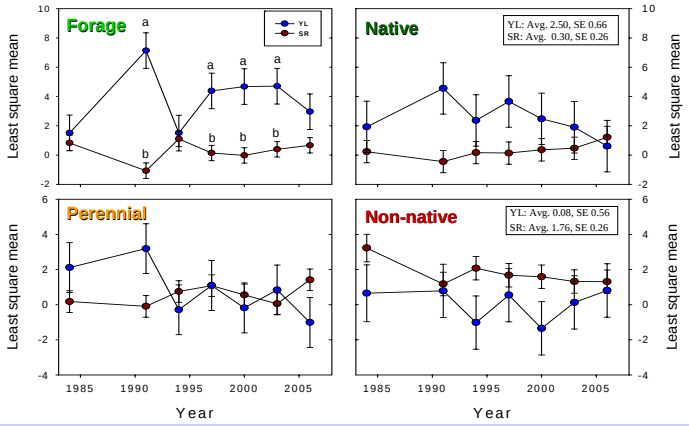
- Measurement of grass abundance (cover and density) on 10 permanent transects in each of the 2 YL pastures and 5 SR pastures occurred since 1972 on the Santa Rita Experimental Range, AZ.
- Skew calculated for four perennial grass groups: long-lived forage, native, non-native and total perennial.
- Analytical model: Split-plot ANOVA with year as the split, grazing system (YL vs. SR) as main effects, and precipitation and mesquite cover as covariates.
- Covariates account for influences other than grazing system.

RESULTS

Table 1. *P*-values from the split-plot ANOVA of spatial distribution measured by the skew of grass cover and density over 22 years with grazing system (GS) main effect, precipitation (PPT) and mesquite cover gradients (MESQ) as covariates and year (YR) as the split.

Plant variable	GS	PPT	MESQ	YR	YR x GS	YR x PPT	YR x MESQ
COVER							
Perennial	0.73	0.96	0.96	0.31	0.47	0.54	0.61
Native	0.03	0.01	0.03	0.81	0.79	0.89	0.90
Forage	<0.01	<0.01	<0.01	0.04	0.03	0.03	0.04
Non-native	0.05	0.04	0.10	0.37	0.93	0.97	0.97
DENSITY							
Perennial	0.59	0.53	0.37	0.93	0.42	0.71	0.76
Forage	0.22	0.09	0.06	0.91	0.97	0.88	0.91
Native	0.95	0.93	0.69	0.96	0.86	0.89	0.92
Non-native	0.33	0.40	0.98	0.06	0.07	0.73	0.58

Fig 1. The Least Square Means of skew for grass cover for the four (4) groups under seasonal rotation (SR) and yearlong (YL) grazing over time, after accounting for covariate effects.



Partial funding by USDA Forest Service Rocky Mountain Research Station and Arizona Agricultural Experiment Station.

DISCUSSION

- Skew of grass cover was related to grazing system and covariates, but skew of grass density was not related to these variables (Table 1).
- However, the skew-grazing system relationship differed among grass categories, contrary to expectations.
- These differences in spatial homogeneity occurred when no differences in average abundance was detected between grazing systems (Mashiri *et al.* in review).

Skew of grass cover

- As expected, the skew of Native and long-lived Forage grass cover was less under seasonal rotation (SR) than yearlong (YL), but forage grasses showed a significant GS by year interaction (Table 1, Fig.1).
- Temporal differences in the availability of Forage species may have contributed to the intermittent pattern.
- Contrary to expectations, skew of Non-native grass cover was greater under seasonal rotation and total Perennial grass cover was not related to grazing system (Table 1, Fig. 1).
- Possibly, selective grazing under YL grazing may lead livestock to avoid Non-native grass such as Lehmann lovegrass resulting in skew near zero.
- Taxonomic variation in the skew-grazing system relationship is antithetic to the premise of uniform impact by seasonal livestock rotation.

Skew of grass density

- Skew of grass density may not be related to grazing systems because plant recruitment and death is more sensitive to temporal variation in precipitation whereas plant size and cover are more sensitive to grazing.