Optimizing Cow-Calf Pasture Management Systems: Plant and Animal Responses

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Introduction

- Rotational stocking (RS) and management-intensive grazing (MiG) reportedly enhance pasture and animal performance.
- Adoption of RS and MiG have been low - Why?
  - Lack of conclusive data on RS
  - Lack of published scientific data on MiG
  - Uncertainty about economic merits of adoption
- Benefits dependent on stocking rate; experiments need 3 stocking rate levels.

Objective

Determine the influence of grazing method and stocking rate on pasture and cow-calf performance with hay making/feeding as part of the systems.

Site Description

- 100-acre, naturalized, mixed, tall-grass pasture in southwestern Quebec
- Initial botanical composition
  - 30% Smooth bromegrass (*B. inermis* Leyss.)
  - 27% Reed canarygrass (*P. arundinacea* L.)
  - 17% Quackgrass (*E. repens* (L.) Nevski)
  - 9% Timothy (*P. pratense* L.)
- Two grazing seasons: late May to early Oct. 1997-98
- No N used
- Rainfall: 36% above avg. in 1997; 18% below avg. in 1998.

Materials and Methods

- 3 X 3 factorial of rotational frequency (RF) and stocking rate (SR)
- 2 replications of randomized complete block design
- 61 purebred black and red Angus cows and spring-born calves randomly assigned each year

Materials and Methods

- **Season-long stocking rates**
  - **“High”: 1.25 acres per cow-calf pair**
  - **“Medium”: 1.75 acres per pair**
  - **“Low”: 2.25 acres per pair**
- **Rotational frequencies**
  - **“High”: avg. 2 d grazing period (1-3 d, 16 paddocks)**
  - **“Medium”: avg. 6 d grazing period (4-8 d; 6 paddocks)**
  - **“Low”: continuous stocking (CS)**

Materials and Methods

- Hay harvested in RS paddocks (HIGH and MEDIUM) when supply exceeded animal demand
- Hay fed when forage availability limited
- CS paddocks clipped to 6” residual in late July

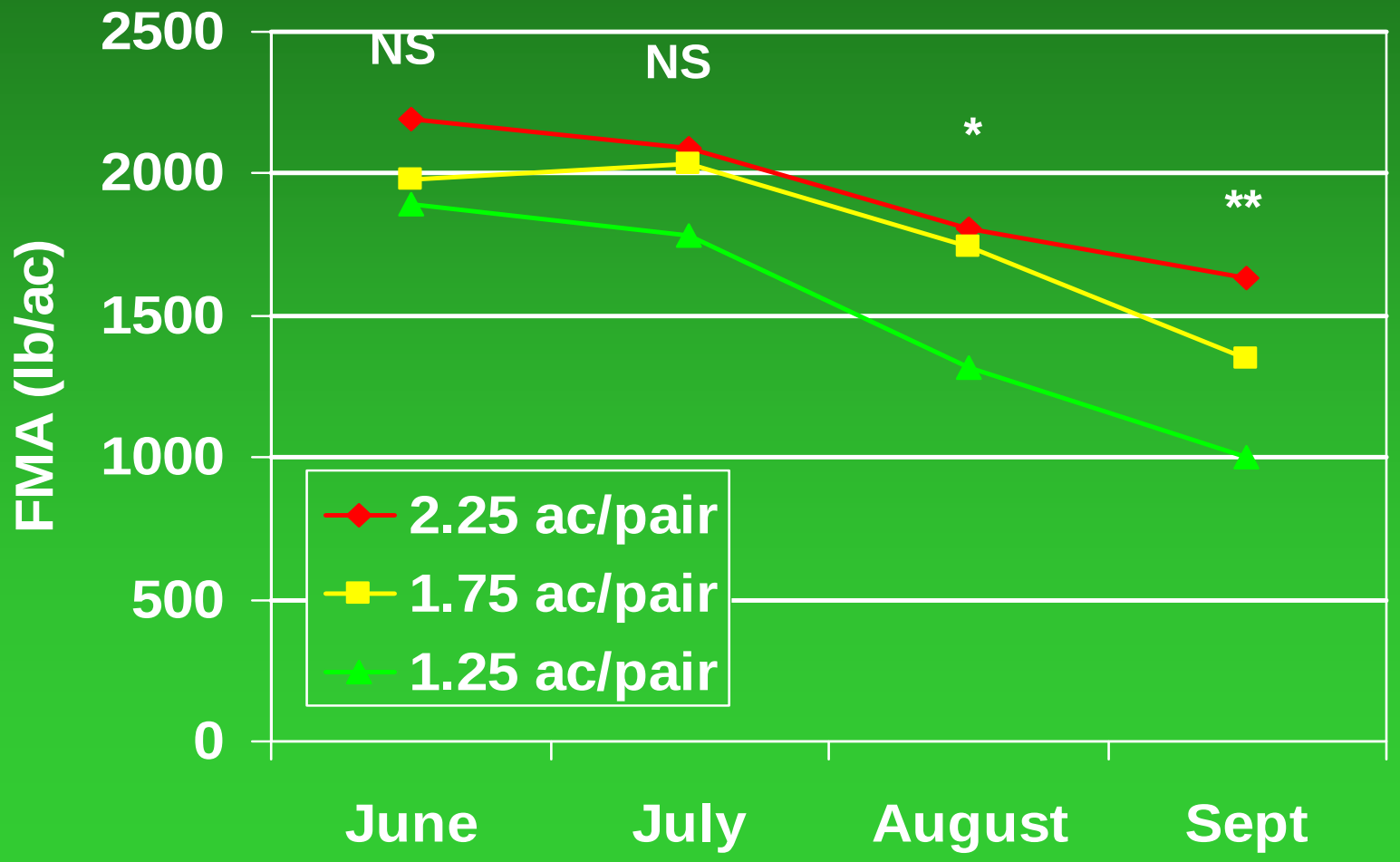
Data Collected

- Animal gain per head and per acre, 2X per month
- “Forage mass available” (FMA)
  - 6 quadrats hand-clipped
  - For RS: monthly mean of pre- and post-grazing mass to a 1” residual
  - For CS: mean of forage mass at beginning and middle of month
- Crude Protein, ADF, and NDF

Statistical Analyses

- All data analyzed by month to remove influence of seasonality of forage growth
- FMA and forage quality data analyzed using GLM (SAS)
- Animal performance data analyzed using Proc Mixed (SAS)
- Effects of RF, SR, and RF X SR partitioned into linear and quadratic components

Influence of SR on monthly average FMA averaged over 3 RFs and 2 grazing seasons



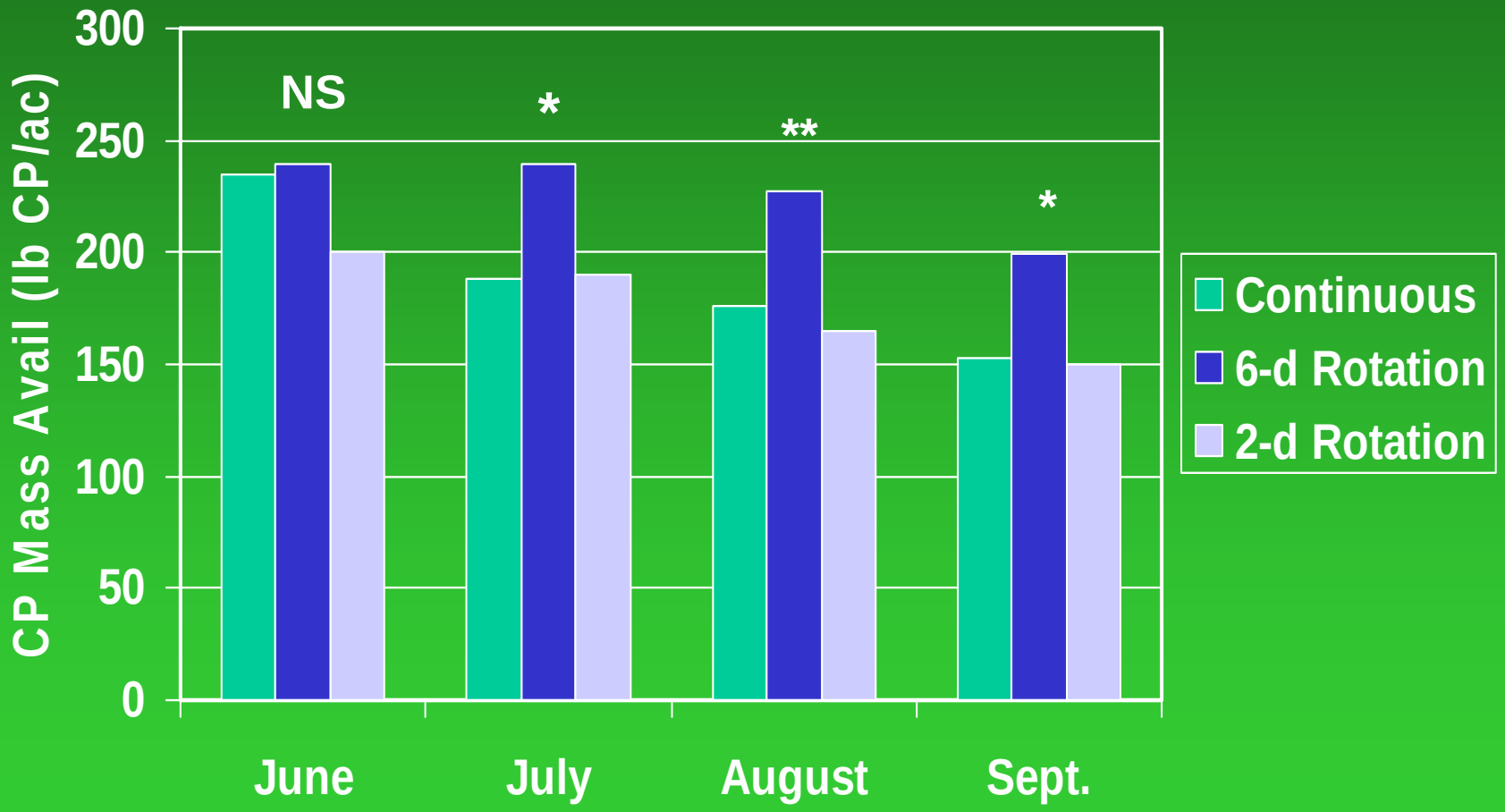
Hay Supplementation (lb DM ac^{-1})

RF	SR	1997	1998
CS	High	757	747
	Medium	67	175
6d RF	High	190	359
	Medium	101	0
2d RF	High	693	942
	Medium	255	0

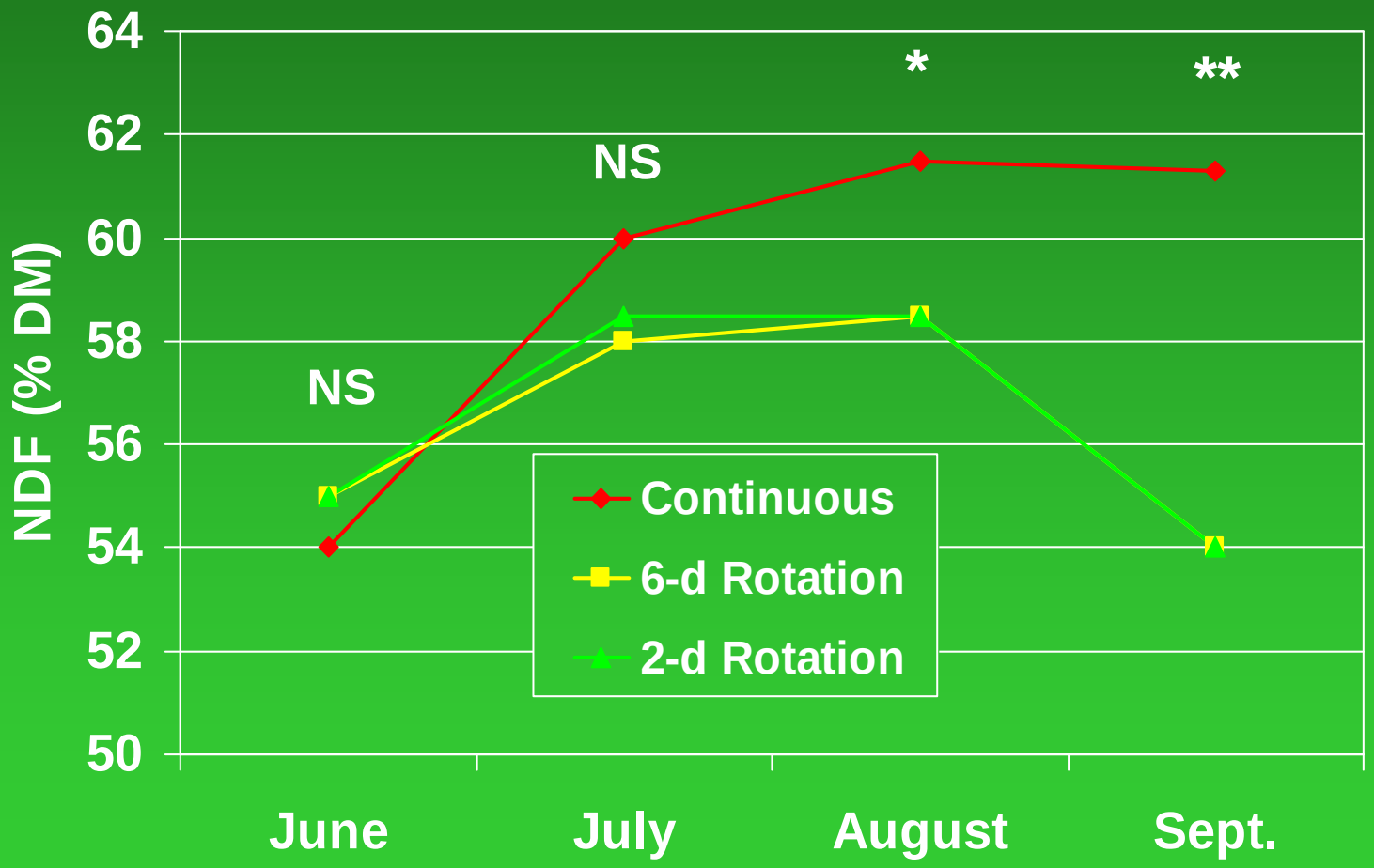
Results - Forage Mass

- RF did not influence FMA
- Hay supplementation:
  - 2d RS > CS > 6d RS
- Pasture productivity:
  - 6d RS > CS > 2d RS?
- Increasing SR reduced late season FMA:
  - 27% decrease in Aug. FMA
  - 39% decrease in Sept. FMA

Influence of RF on CP Mass Available averaged over 3 SRs and 2 grazing seasons



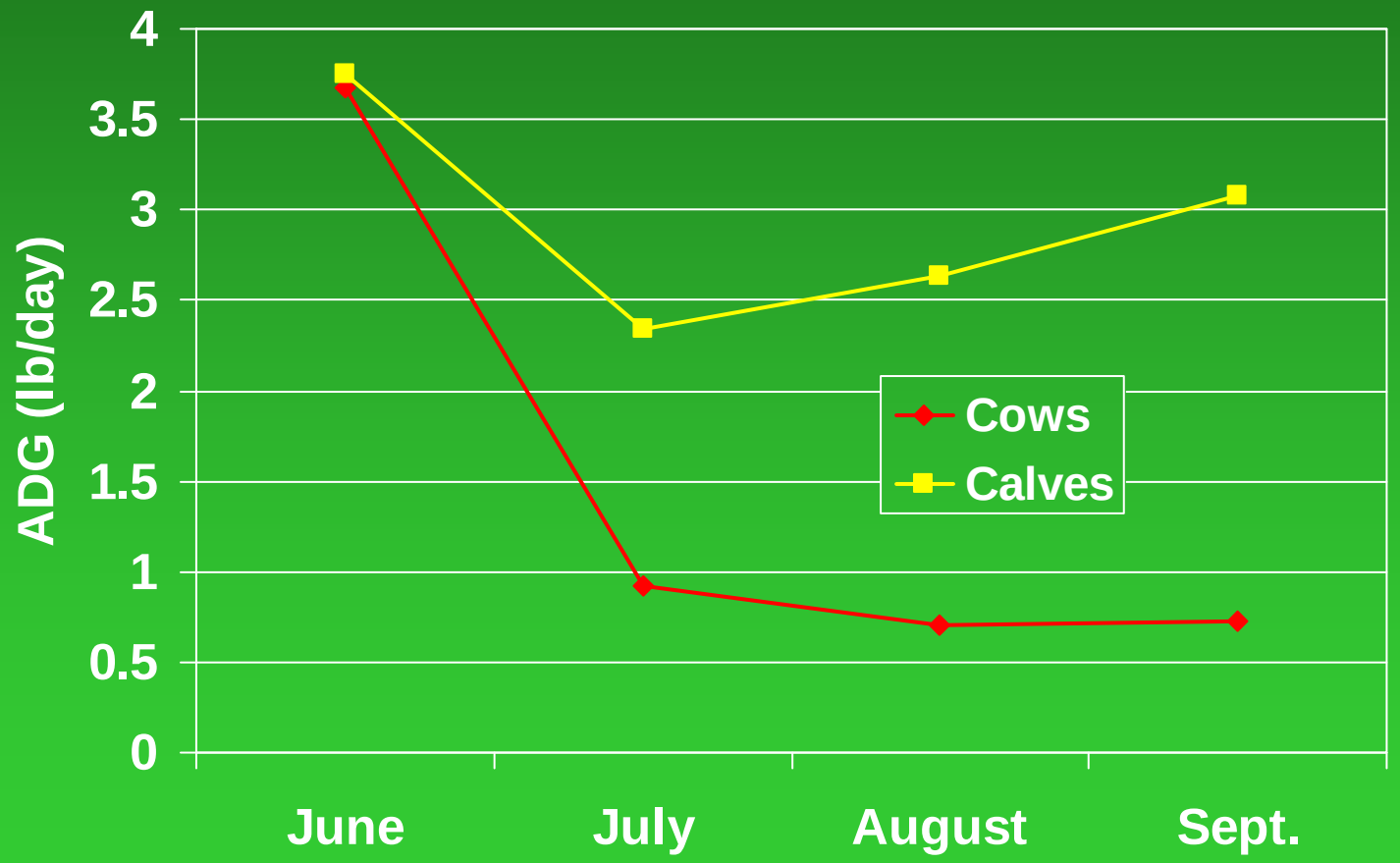
Influence of RF on NDF Concentration of FMA averaged over 3 SRs and 2 grazing seasons



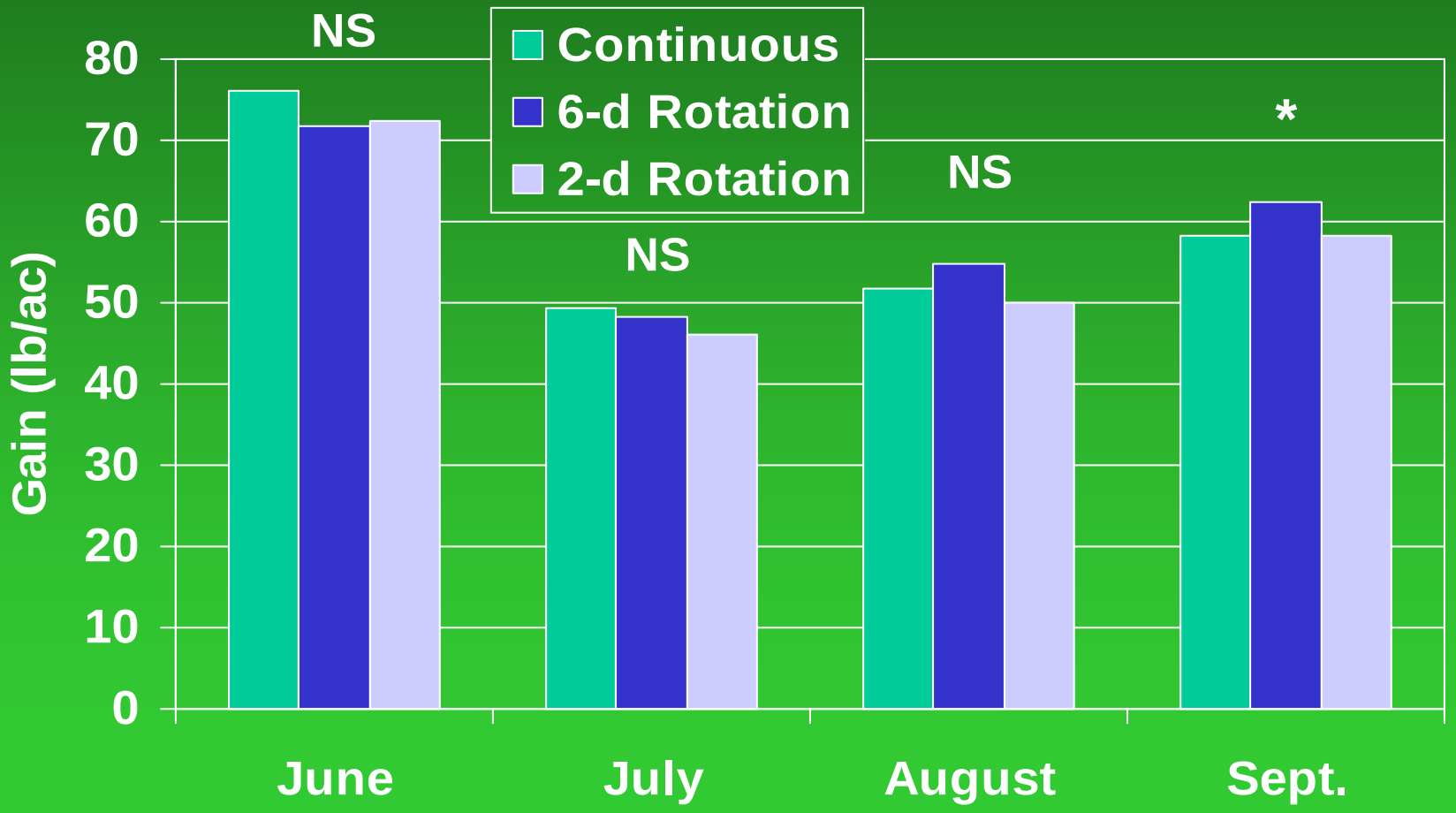
Results - Forage Quality

- Interaction of SR and RF on CP in June
  - low SR: CP increased as RF increased
  - high SR: CP decreased as RF increased
  - selectivity and herbage allowance
- CP greatest with 6-d RF (July-Sept.)
- Late season ADF and NDF decreased linearly as RF increased
- Overgrazing in 2-d RF?

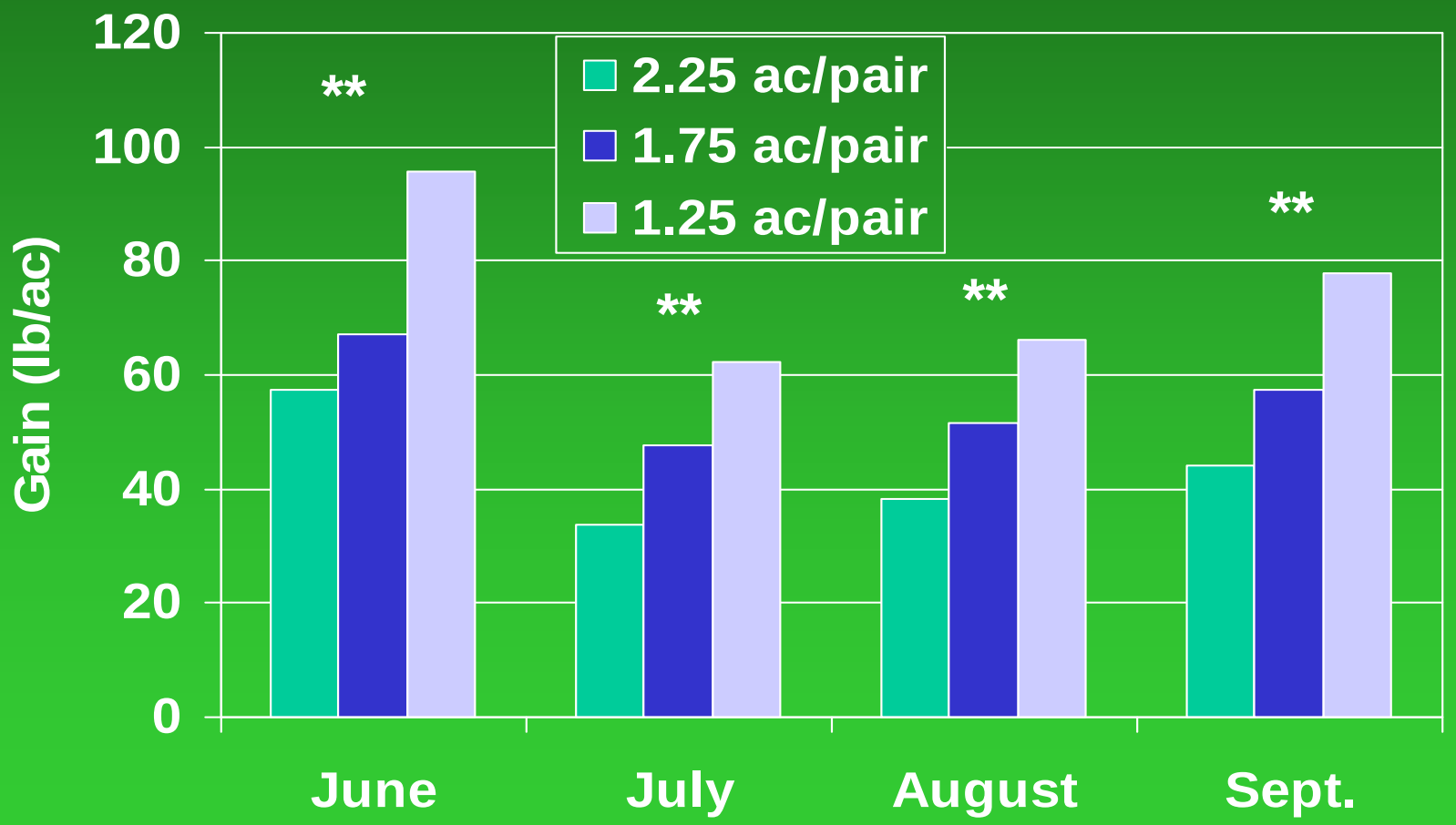
ADG of Cows and Calves averaged over 3 RFs, 3 SRs, and 2 grazing seasons



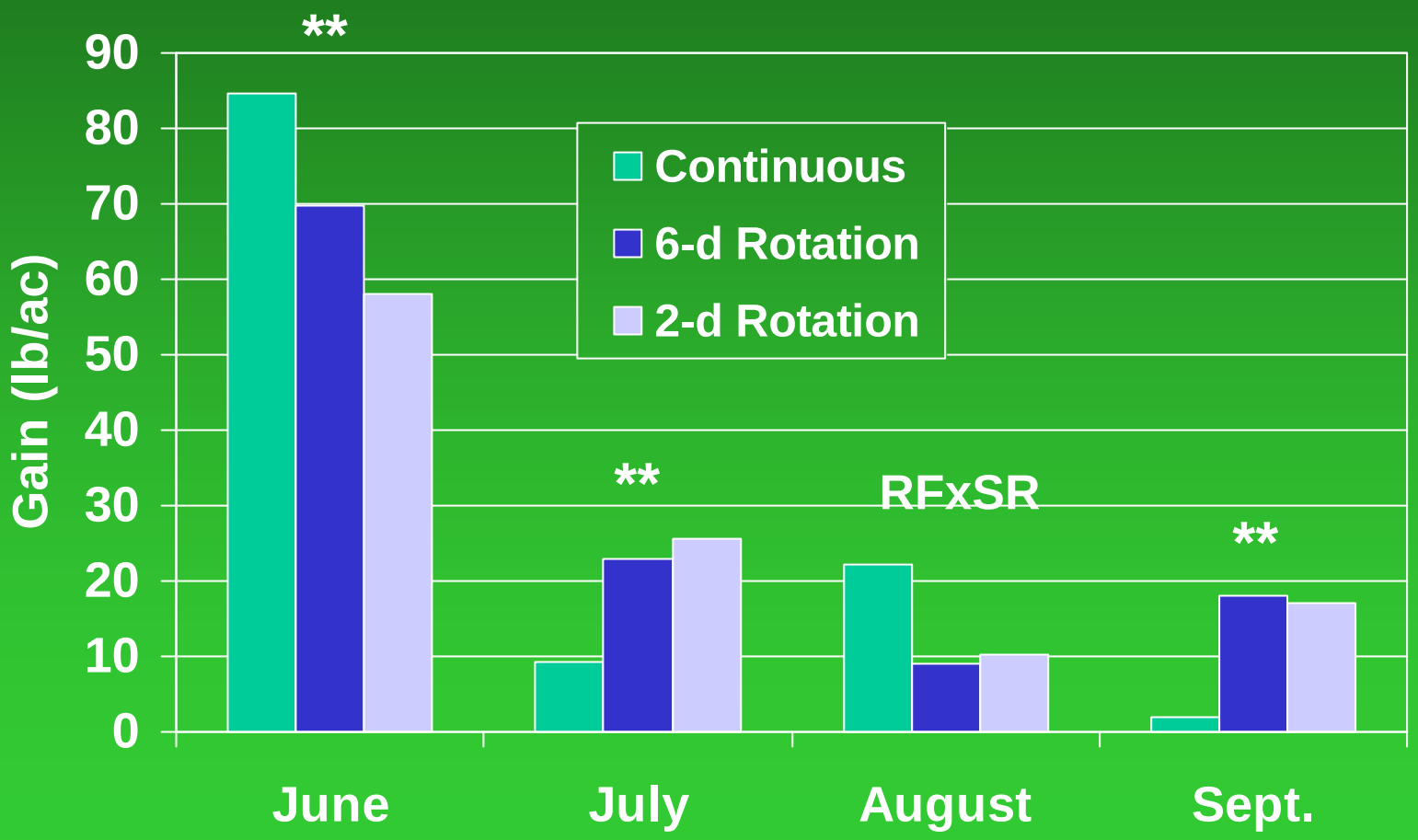
Influence of RF on Calf Gain Per Acre averaged over 3 SRs and 2 grazing seasons



Influence of SR on Calf Gain Per Acre averaged over 3 RFs and 2 grazing seasons



Influence of RF on Cow Gain Per Acre averaged over 3 SRs and 2 grazing seasons



Results - Animal Performance

- Cows gained 60% of their total season weight gain during June when gain was greatest with CS.
- RS produced slightly greater cow performance than CS during late season.
- Increasing SR consistently increased calf gain per acre without compromising calf ADG.
- RF had little impact on calf performance; cows buffered their responses.

Summary and Conclusions

- Grazing method did not influence forage availability.
- 6-d RS provided the best forage quality.
- Animal performance was influenced by SR much more than RF.
- With hay production and feeding as part of the systems, a medium (6-d) RF at a high SR produced the greatest grazing season cow-calf production on naturalized, mixed tall-grass pasture.