

# Grazing Management of Beef Cows to Limit Non-point Source Pollution of Streams in Midwestern Pastures

Jim Russell, D. Bear, K. Schwarte, and M. Haan  
Iowa State University  
Dept. of Animal Science

---

---

---

---

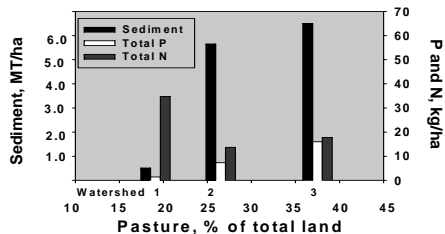
---

---

---

---

**ANNUAL SEDIMENT, PHOSPHORUS, AND NITROGEN LOADING OF ROCK CREEK LAKE FROM TRIBUTARIES WITH DIFFERENT PROPORTIONS OF PASTURELAND (Downing et al., 2000)**




---

---

---

---

---

---

---

---

## HYPOTHETICAL ROUTES OF NONPOINT SOURCE POLLUTION BY GRAZING CATTLE



Direct manure deposition



Stream bank erosion



Surface run-off

---

---

---

---

---

---

---

---

**FACTORS CONTROLLING THE EFFECTS OF GRAZING ON WATER QUALITY**

- Location of grazing
- Timing of grazing
- Intensity of grazing
- Length of grazing




---

---

---

---

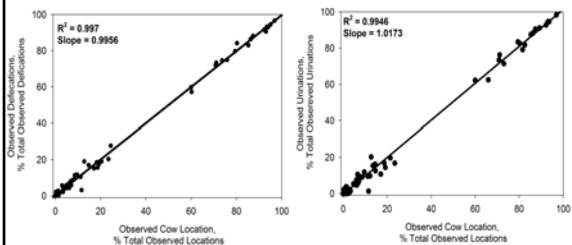
---

---

---

---

**EFFECTS OF COW DISTRIBUTION ON DISTRIBUTION OF FECES AND URINE IN PASTURES**




---

---

---

---

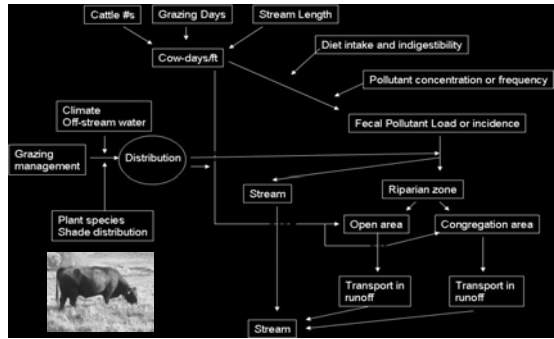
---

---

---

---

**MODEL FOR QUANTIFYING THE EFFECTS OF GRAZING MANAGEMENT ON NONPOINT SOURCE POLLUTION OF PASTURE STREAMS**




---

---

---

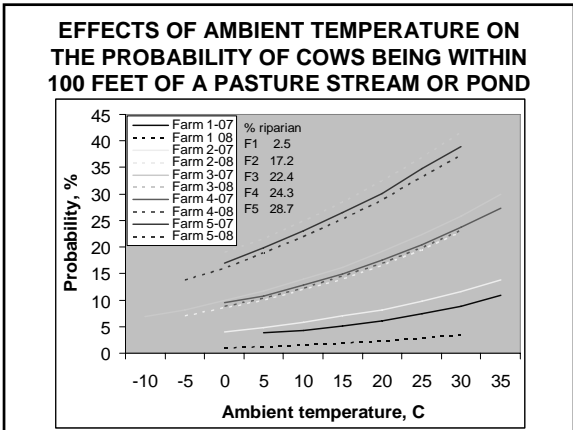
---

---

---

---

---




---

---

---

---

---

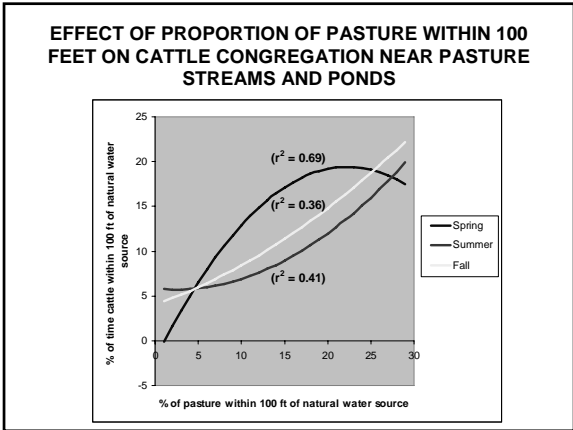
---

---

---

---

---




---

---

---

---

---

---

---

---

---

---

### IMPLICATIONS OF PASTURE SIZE AND SHAPE ON CATTLE TEMPORAL/SPATIAL DISTRIBUTION RESEARCH

Ref. (State)	Pasture size, ac	Treatment	Est. distance between treatment and stream, ft	Stream and/or riparian effects
Sheffield et al., 1997 (VA)	35 – 55	Offstream water	14	Reduced congregation
Porath et al., 2002 (OR)	30	Offstream water	1625	Reduced congregation
Byers et al., 2005 (GA)	43	Offstream water	296	Reduced congregation
"	35	Offstream water	263	No significant effect on congregation
Agouridis et al., 2005 (KY)	5 – 7.5	Offstream water	234	No effect on congregation
Line et al., 2000 (NC)	103	Offstream water	160	No effect on NPS

---

---

---

---

---

---

---

---

---

---

**IMPLICATIONS OF PASTURE SIZE AND SHAPE ON CATTLE TEMPORAL/SPATIAL DISTRIBUTION**  
Regulatory

- Treatments to control NPS of pasture streams seem likely to be most effective on small or narrow pastures.

---

---

---

---

---

---

---

---

**PERCENTAGE OF TIME GRAZING CATTLE ARE IN AND WITHIN 110 FT OF A PASTURE STREAM**  
 30-acre pastures  
 463-ft stream reach

2006-07

Month	% of observations in stream
May	0.5
June	2.0
July	2.3
Aug	0.8
Sept	0.2
Avg	1.0

2006-07

Month	% of observations within 110 ft of stream
May	13.5
June	10.5
July	11.0
Aug	8.0
Sept	10.0
Avg	10.5

CSU = Continuous stocking unrestricted

---

---

---

---

---

---

---

---

**EFFECT OF RESTRICTING STREAM ACCESS TO STABILIZED CROSSING ON CONGREGATION OF CATTLE IN OR NEAR PASTURE STREAMS**

2006-07

Month	CSU (%)	CSR (%)
May	0.5	0.2
June	2.0	0.5
July	2.3	1.0
Aug	0.8	0.3
Sept	0.2	0.1
Avg	1.0	0.5

2006-07

Month	CSU (%)	CSR (%)
May	13.5	1.0
June	10.5	2.0
July	11.0	3.0
Aug	8.0	2.0
Sept	10.0	1.0
Avg	10.5	10.0

CSU = Continuous stocking unrestricted  
 CSR = Continuous stocking restricted

---

---

---

---

---

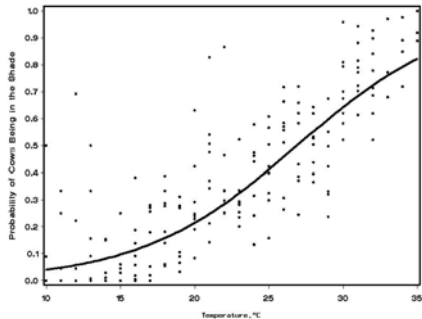
---

---

---



### EFFECTS OF AMBIENT TEMPERATURE ON THE PROBABILITY OF COWS SEEKING SHADE



---

---

---

---

---

---

---

---

### EFFECTS OF GRAZING MANAGEMENT ON NONPOINT SOURCE POLLUTION OF PASTURE STREAMS



---

---

---

---

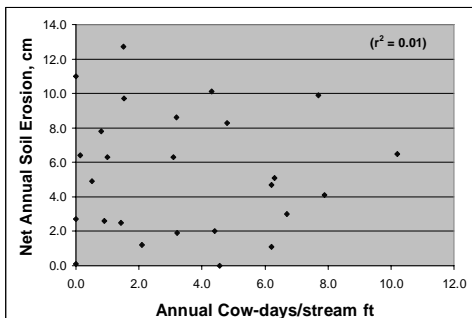
---

---

---

---

### EFFECTS OF STOCKING RATE ON STREAM BANK EROSION ON 13 FARMS IN THE RATHBUN LAKE WATERSHED



---

---

---

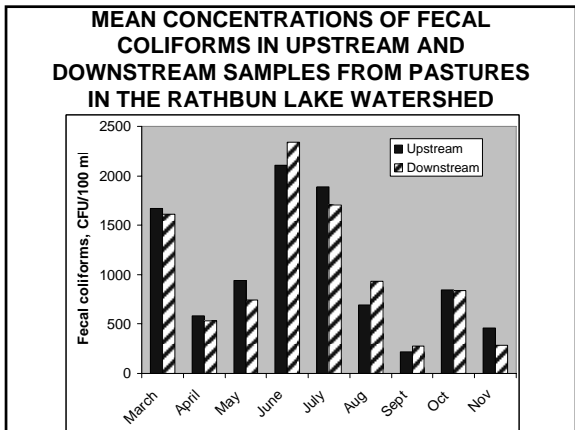
---

---

---

---

---




---

---

---

---

---

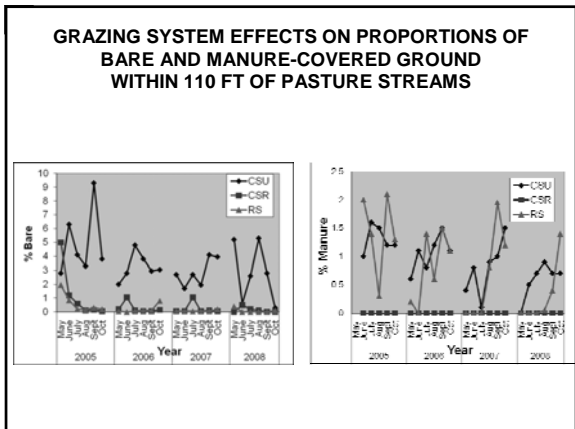
---

---

---

---

---




---

---

---

---

---

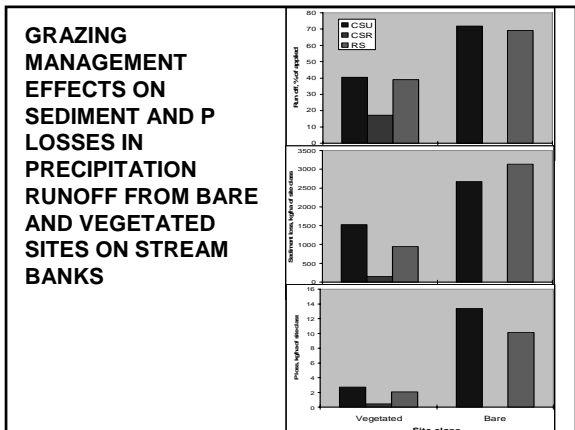
---

---

---

---

---




---

---

---

---

---

---

---

---

---

---

### IMPLICATIONS

- Stream bank erosion seems primarily related to stream hydrology and not grazing.
- Coliform and pathogen loading of pasture streams comes from numerous sources including wildlife and humans.
- Improper grazing management may increase:
  - Bare ground near pasture streams
  - Manure concentration near pasture streams
  - Sediment and nutrient loading of precipitation runoff
- Risks of grazing on pasture streams may be controlled by:
  - Stabilized crossings with riparian buffers
  - Rotational grazing
  - Off-stream water
- Greatest risk of NPS pollution from grazing occurs in small and/or narrow pastures.

---

---

---

---

---

---

---

---



**Acknowledgements:**

- This project is supported in part by:
  - The Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture, under Award No. 2006-51130-03700
  - The Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture, under Award No. 2007-51130-03700

---

---

---

---

---

---

---

---