Soil & Water Conservation and Livestock Systems

Identifying and managing resource concerns on livestock farms

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Soil & Water Conservation and Livestock Systems

Identifying and managing resource concerns on livestock farms

Objectives:

- Understand how livestock farms are different
- Identify special resource concerns for livestock farms
- Review best practices for livestock farm resource concerns

How are livestock farms different?

- Possible inclusion of:
  - Pastureland
  - Forage crops
- Possible use of:
  - Cover crops for grazing or harvested forage
  - Buffers for grazing or harvest
  - Crop residue for grazing, feed, or bedding
  - Streams or ponds for livestock water
  - Manure as a nutrient source

Pastureland

- Differences from row crop land:
  - Reduced erosion potential
  - Increased water infiltration
  - Increased/decreased nutrient loss potential
  - Increased soil organic matter
  - Improved soil health
  - Increased wildlife support

Forage Crops (corn silage)

- Differences from row crop land:
  - Increased erosion potential
  - Increased nutrient loss potential
  - Easier seeding for following cover crops, which could reverse the previous two points

Photo: Ohio State University Extension

Photo: University of Wisconsin Extension

Forage Crops (corn silage)

Forage Crops (perennial)

- Differences from row crop land:
  - Reduced erosion potential
  - Increased water infiltration
  - Reduced nutrient loss potential
  - Increased soil organic matter
  - Improved soil health
  - Increased wildlife support

Grazing cover crops

- Differences from non-grazed:
  - Increased erosion potential
  - Increased nutrient loss potential
  - Possible surface soil compaction/disturbance
  - Increased financial return to cover crops

Using the cover crop biomass for grazing livestock or harvesting it for forage is the most likely source of additional revenue (or cost savings in a crop/livestock system) that would result in positive net returns to cover crops.
- Economic Evaluation of Cover Crops in Midwest Row Crop Farming, A. Plastina

Photo: Beth Doran, ISU

Harvesting cover crops

- Differences from non-harvested:
  - Possible increased erosion potential (harvest timing)?
  - Possible increased nutrient loss potential (timing)?
  - Increased financial return to cover crops
  - Reduced planting challenges

Photo: Kiera Crowley, Cornell University

Grazing buffers

- Differences from non-grazed:
  - Increased erosion potential
  - Increased nutrient loss potential
  - Increased financial return to buffers
  - Potential wildlife disturbance

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Harvesting buffers

- Differences from non-harvested:
  - Possible increased erosion potential
  - Possible increased nutrient loss potential
  - Increased financial return to buffers

Grazing crop residue

- Differences from non-grazed:
  - Increased erosion potential
  - Increased nutrient loss potential
  - Possible surface soil compaction/disturbance
  - Increased financial return to corn

Harvesting crop residue

- Differences from non-harvested:
  - Increased erosion potential
  - Increased nutrient loss potential
  - Increased fertilizer need (unless manure is returned)
  - Increased financial return to corn
  - Reduced planting challenges

Ponds

- In addition to supplying livestock water, ponds can:
  - Trap additional sediment from runoff water
  - Trap additional nutrients from runoff water
  - Provide wildlife habitat

Manure as a nutrient source

- Differences from commercial fertilizer:
  - Decreased/increased nutrient loss potential
  - Increased soil organic matter
  - Additional micronutrients
  - Increased difficulty balancing nutrient ratios

Managing Resource Concerns

- Using Best Management Practices

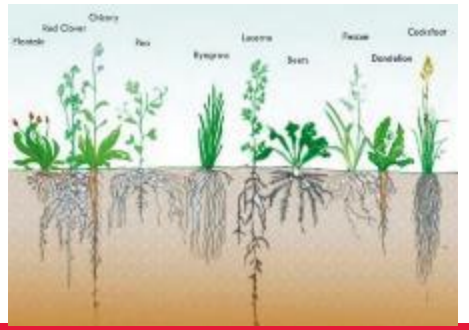
Pastureland

- Potential resource concerns:
  - Increased erosion from poor pasture stand/condition
  - Nutrient loss from only surface-applied nutrients
  - Nutrient/pathogen loss from manure accumulations
  - Gully erosion from traffic patterns or concentrated flow
- Best Management Practices
  - Grassed waterways for conc. flow
  - Soil testing and fertility management
  - Nutrient application timing for lower risk
  - Livestock management to disperse manure

Pastureland

Pastureland

- Best Management Practices (continued)
  - Livestock management to prevent traffic paths
  - Rotational grazing / paddock resting
  - Distributed watering locations
  - Plant species evaluation and diversity
  - Appropriate reseeding or interseeding
  - Weed and pest management



Additional Erosion Control Practices

- Pastureland
  - Address concentrated flow
  - Water diversions

Pastureland

Nitrogen Reduction Practices

	Practice	Comments	% Nitrate-N Reduction*	% Corn Yield Change**
			Average (SD†)	Average (SD†)
Land Use	Perennial	Energy Crops – Compared to spring-applied fertilizer	72 (23)	
		Land Retirement (CRP) – Compared to spring-applied fertilizer	85 (9)	
	Extended Rotations	At least 2 years of alfalfa in a 4 or 5 year rotation	42 (12)	7 (7)
	Grazed Pastures	No pertinent information from Iowa – assume similar to CRP	85	

Phosphorus Reduction Practices

	Practice	Comments	% P Load Reduction[a]	% Corn Yield Change[b]
			Average (SD[c])	Average (SD[c])
Land Use Change	Perennial Vegetation	Energy Crops	34 (34)	
		Land Retirement (CRP)	75	
		Grazed pastures	59 (42)	

Source: Reducing Nutrient Loss: Science Shows What Works, ISU SP435A

Forage crops (corn silage)

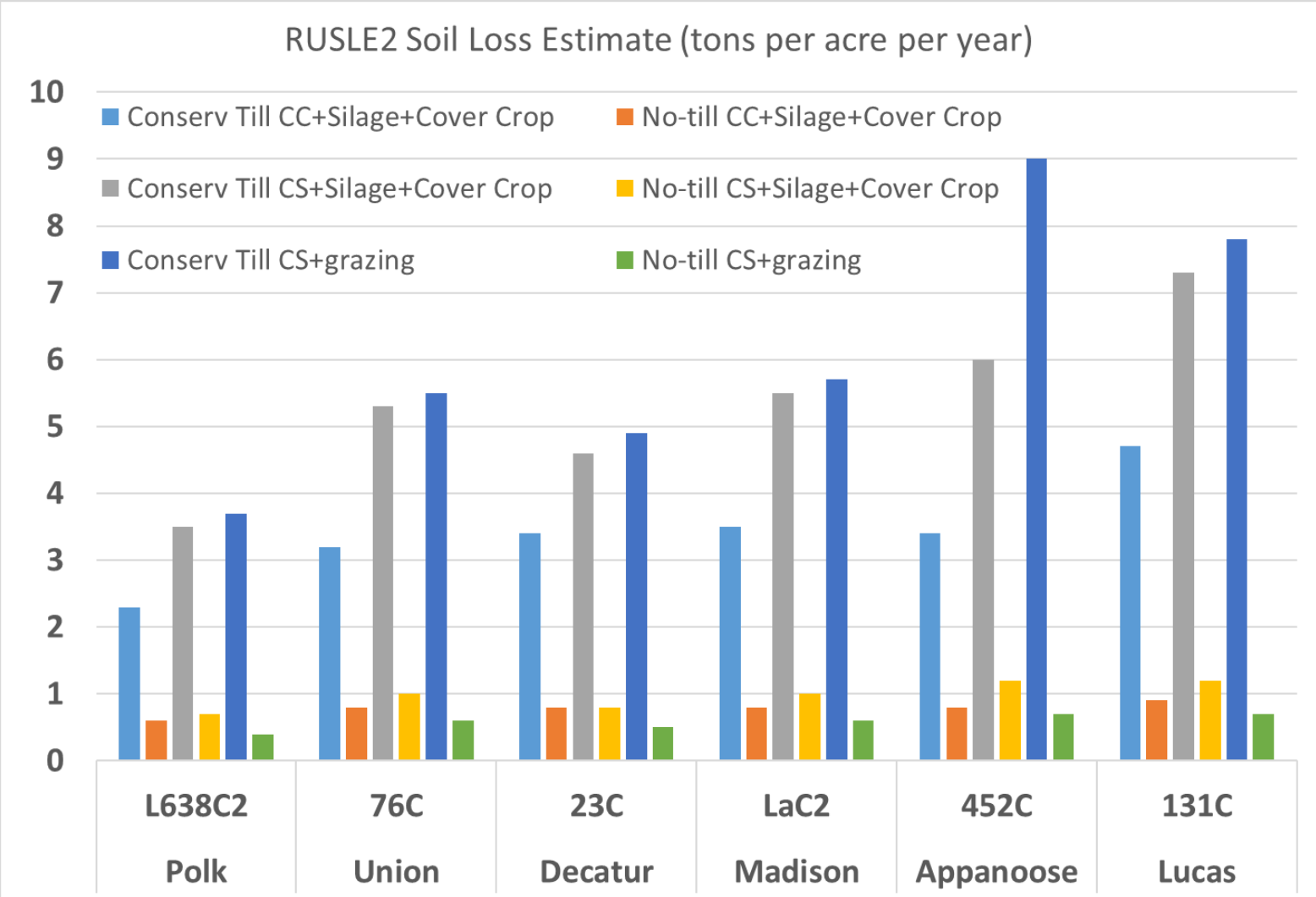
- Potential resource concerns:
  - Increased erosion from low surface residue
  - Decreased infiltration from raindrop impact
  - Declining soil organic matter
- Best Management Practices
  - Field location selection for reduced erosion risk
  - Cover crops
  - Manure application to return residue / organic matter

Forage crops (corn silage)

Additional Erosion Control Practices

- Forages (corn silage)
  - Contouring

Forage crops (corn silage)



Forage crops (corn silage)

Nitrogen Reduction Practices

	Practice	Comments	% Nitrate-N Reduction*	% Corn Yield Change**
			Average (SD†)	Average (SD†)
	Cover Crops	Rye	31 (29)	-6 (7)
		Oat	28 (2)	-5 (1)

Phosphorus Reduction Practices

	Practice	Comments	% P Load Reduction[a]	% Corn Yield Change[b]
			Average (SD[c])	Average (SD[c])
	Cover Crops	Winter rye	29 (37)	-6 (7)

Source: Reducing Nutrient Loss: Science Shows What Works, ISU SP435A

Forage crops (perennial)

- Potential resource concerns:
  - Erosion during establishment year
  - Decreased infiltration from raindrop impact
- Best Management Practices:
  - Residue management during establishment
  - Good establishment timing and management
  - Appropriate nurse crops

Forage crops (perennial)

Nitrogen Reduction Practices

	Practice	Comments	% Nitrate-N Reduction*	% Corn Yield Change**
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Land Use	Perennial	Energy Crops – Compared to spring-applied fertilizer	72 (23)	
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Additional Erosion Control Practices

- Forages & Grasses
  - Contour Buffer Strips

Additional Erosion Control Practices

- Forages & Grasses
  - Contour Buffer Strips

Grazing cover crops

- Potential resource concerns:
  - Increased erosion
  - Increased nutrient loss
  - Surface soil compaction/disturbance
- Best Management Practices:
  - Proper grazing stocking density
  - Proper grazing timing
  - Additional erosion control

Harvesting cover crops

- Potential resource concerns:
  - Increased erosion (depending on harvest timing)
  - Increased nutrient loss (depending on harvest timing)
- Best Management Practices:
  - Additional erosion control practices
  - Timing harvest for minimum soil exposure

Grazing buffers

- Potential resource concerns:
  - Increased erosion
  - Increased nutrient loss
  - Wildlife disturbance
- Best Management Practices:
  - Proper grazing stocking density
  - Proper grazing timing
  - Watering options for streamside buffers

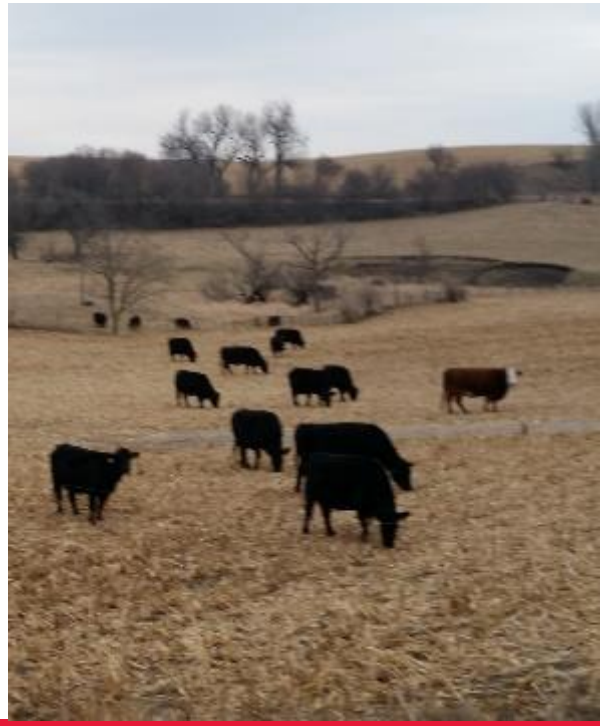
Harvesting buffers

- Potential resource concerns:
  - Increased erosion
  - Increased nutrient loss
  - Wildlife disturbance
- Best Management Practices:
  - Additional erosion control practices
  - Timing harvest for minimum soil exposure
  - Timing harvest around nesting seasons

Harvesting buffers

Grazing crop residue

- Potential resource concerns:
  - Increased erosion potential
  - Increased nutrient loss potential
  - Surface soil compaction/disturbance
- Best Management Practices
  - Proper grazing stocking density
  - Proper grazing timing
  - Additional erosion control practices



Harvesting crop residue

- Potential resource concerns:
  - Increased erosion potential
  - Increased nutrient loss potential
- Best Management Practices
  - Choosing fields with lowest erosion risk
  - Selective harvest (partial field or partial percentage)
  - Returning manure/bedding to harvested fields

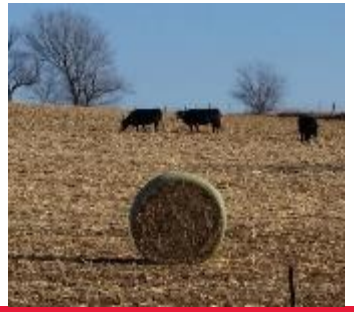
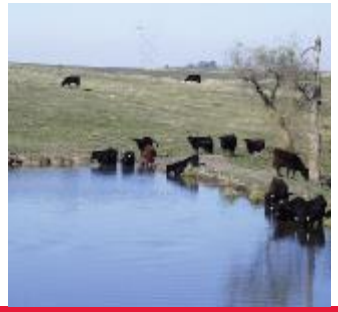
Harvesting crop residue

Ponds

- Potential resource concerns:
  - Bank erosion from direct livestock access
- Best Management Practices:
  - Restricted grazing access to pond banks
  - Restricted watering access
  - Water withdrawal to remote water fountains

Manure as a nutrient source

- Potential resource concerns:
  - Increased nutrient loss
  - Increased difficulty balancing nutrient ratios
- Best Management Practices:
  - Incorporate manure
  - Timing of manure application for minimum risk
  - Setback distances/buffers for sensitive areas
  - Application rate management
  - Apply less frequently, or to fields that need all nutrients

Summary

- Livestock farms have different resource management concerns than crop-only farms
- Identification of concerns and application of appropriate best management practices can address the concerns
- Integration of livestock into crop farms can provide economic and environmental benefits