Grazing Land Management and Water Quality

- In generally management of grazing lands requires fewer chemical inputs such as fertilizers and herbicides.
- However, grazing lands account for a larger land surface than cropland
- Therefore, there impacts on water quality must be considered

Grazing Land Management and Water Quality

- Traditional grazing management is generally less problematic
  - No supplemental fertilizers
  - Few pesticides
- However, the distribution of manure and soil disturbance can be problematic
- Traffic and defecation near and/or in stream channels is a significant source of nutrient and sediment pollution

Grazing Land Management and Water Quality

- Commercial/intensive grazing systems can have problems similar to cropland if not properly managed.
  - In addition to traffic and defecation in stream channels
  - Excess nutrient applications can cause Nutrient stratification and loss of soluble nutrients

Grazing and Conservation Buffers

- Filter strips and grass buffers placed down slope from cropland are effective conservation tools to reduce transport of pollutants to surface waters
- Effectiveness of buffers is a function of its height, density and age of vegetation
- Grazing and/or haying is generally prohibited by NRCS Programs
- Buffers can be managed to improve wildlife habitat to offset decreased grazing/crop prodution potential

Grasslands and Bioenergy Production

- Lignocellulosic biomass can be used for direct generation of energy through combustion
- Current technologies are also capable of producing ethanol from lignocellulosic biomass
- The real question:
  - Can bioenergy outbid animal production for the biomass???

Grasslands and Bioenergy Production

- Biofuel produced from grasses can be carbon negative
  - Will take up more CO2 from the atmosphere than what is released during the production cycle.
- When new stands of permanent grass such as switchgrass are planted on planted on previously cultivated soils the net decrease in CO_2 emitted is even greater due to soil carbon sequestration

Grasslands and Bioenergy Production

- It is often stated that grasses can be grown on marginal lands for bioenergy
- This has come under question in the past few years.
  - Economics may not work out
  - Yields must be high enough to pay for harvest and transportation costs

Grasslands and Bioenergy Production

- Utilizing CRP lands for Bioenergy
- CRP lands are highly erodible
- Many CRP lands have very low productivity
- Those that are erodible yet productive could be economically viable options for bioenergy
  - This could reduce the cost of CRP program and maintain permanent cover
  - Of course grazing could accomplish this if properly managed

Grazing Methods

- There are a variety of grazing methods
- Optimum grazing methods are dependent on:
  - Climate
  - Species composition of the pasture
  - Need for additional ecosystems services
    - Wildlife habitat
    - Recreational value of rangeland is in many cases greater than value for grazing

Examples of Grazing Method

- Continuous grazing:
  - Unlimited access for an unlimited time
  - Can adversely impact soils if stocking rate is to high for droughty periods.
- Mixed grazing:
  - Two or more animal species grazing the same field.
  - Can provide better utilization of forage because species will differ in their forage selection

Examples of Grazing Method

- Rotational grazing:
  - Animals are moved from one paddock to another in systematic intervals
- Intermittent grazing:
  - Moving animals from one paddock to another in non-systematic intervals
- Non-continuous grazing systems have in the past been thought to decrease potential for overgrazing and soil deterioration
- However, Stocking rate is much more important

Stocking Rate

- In native systems stocking rate is dependent on rainfall and species composition
  - A base stocking rate that is 75% of the average carrying capacity of the field will provide resilience against drought
    - Prevents overgrazing and/or need to sell animals due to lack of forage
  - In average or above average years additional animals can be purchased to take advantage of excess forage

Stocking Rates

- In introduced grass systems both rainfall and nitrogen availability dictate stocking rates.
  - Again base stocking rates should be set to ~75% of average carrying capacity
  - In average or above average years hay production in addition to grazing is a option
  - Nitrogen as well as other deficient nutrients must be applied to realize production potential
  - Nitrogen deficiencies can result in overgrazing

Benefits of Grazing

- Moderate grazing is beneficial to ecosystems services:
  - It increased net productivity by removing excess biomass
  - It can increase species diversity by limiting the growth of dominate species
  - It aids in nutrient cycling
  - It efficiently produces animal protein for human consumption