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 production 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 previously cultivated soils the net decrease in CO2 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 too 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 an 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