Fire is a critical natural process necessary for maintaining ecosystems around the world, providing a means for renewal, regrowth and maintenance of habitats. In grassland and savanna ecosystems, fire plays an important role by limiting encroachment of woody species and cycling nutrients; however, in nearly all grassland and savanna habitats fire was not the only process at work. Historically, fire was closely coupled with grazing – namely by large mammals. These coupled processes, known technically as the fire-grazing interaction or pyric-herbivory, combined to create a diverse habitat matrix in varying stages of succession across the landscape. This habitat diversity provided resources to a broad suite of grassland wildlife species as well as a source of new, fresh regrowth forage to large herds of grazing animals.

In many parts of the world (for example, the Great Plains of North America), widespread suppression of fire and elimination of large grazing animals in the face of human development and agricultural conversion has led to a separation of the fire-grazing processes and a loss of habitat diversity.

In recent years, however, scientists and managers are seeking to restore the fire-grazing interaction by implementing a management practice known as “patch-burn grazing.” This practice seeks to mimic historical patterns of fire and grazing on the landscape by using prescribed fire to burn discrete portions of a pasture or grassland, and allowing free access by moderately stocked grazing animals (typically cattle).
Patch burn grazing takes advantage of a grazing animal’s instinctive attraction to fresh, highly nutritious forage regrowth following a fire. By burning a discrete portion of a pasture or grassland tract each year, grazers naturally spend most of their time foraging in the new regrowth, and avoid unburned areas with standing dead plant material and thicker litter. Repeating this process annually (or semi-annually, using a dormant and growing season fire) essentially creates a rest-rotational grazing system without using interior fencing, instead relying on the animals to move themselves in response to new forage growth. The result is a landscape where each burn unit receives several years’ rest from fire and grazing in the cycle. Plant diversity and wildlife habitat are enhanced, and grazing animal performance is at least equal to if not better than traditional pasture management practices.

Implementing prescribed fire management in a patch-burn grazing system can be tricky at the outset, as some internal firebreaks are necessary to create a burn patch within a larger pasture. In addition to firebreaks on the exterior borders (for example: roads, crop fields), use landscape features such as ponds or streams as firebreaks, or create firebreaks by mowing or light disking. Once implemented, patch-burn grazing can make prescribed fire management easier because the patch grazed the previous year can be used as a fire break.

Above figure adapted from Fuhlendorf and Engle, Bioscience 2005;
J Kerby M.S. thesis, Oklahoma State University
Determining Appropriate Stocking Rates

Using prescribed fire as a management tool in a practice such as patch-burn grazing requires enough fuel to carry a fire the following season. Thus, it is important to use a moderate stocking rate in order to leave some residue with which to carry a prescribed fire. The exact stocking rate depends on the goals for an individual pasture; in general a moderate stocking rate in Iowa might be around 1.0 Animal Unit Months (AUM), or approximately 12 cow-calf pairs on 80 acres for six months. If the goal is to enhance a prairie remnant or seeding with some light grazing, a lighter stocking rate would be appropriate; alternatively, if the goal is to use fire and grazing to suppress cool-season plants, a slightly heavier rate may have the desired effect.

Using Patch-Burn Grazing Effectively

Patch-burn grazing can be an appropriate and effective management practice for many sites, though plant community needs must be considered. Benefits such as control of woody-species encroachment, enhanced plant diversity, and improved wildlife habitat can be realized with effective patch-burn grazing rotation. For non-agricultural or recreational landowners, patch-burn grazing can offer an avenue to work with neighboring landowners to improve and maintain boundary fences, add the benefit of light grazing to their property, and improve local wildlife populations by moderating stocking on adjacent properties.

Monitor grazing throughout the summer to ensure adequate fuel for future burns. Photo courtesy of L.W. Morton.
Left photo shows pasture immediately following a prescribed fire, while the photo below shows the same pasture 14 days later. Note significant forage growth has occurred in those days as opposed to the adjacent unburned areas.

Tips to get started:

1. Have well developed goals for using fire and grazing as management tools
2. Start with conservative stocking rates, adjust as needed
3. Understand the plant community and soil properties of your site
4. Understand inherent differences between species, breed, and class of livestock animals used.

| Potential Benefits of Fire in Grazing Systems | Potential Challenges to Fire in a Grazing Systems |
|---------------------------------------------|-------------------------------------------------
| -Create a rest-rotational grazing system without interior cross fences | -May require a rest year to establish fuel load to carry fires |
| -Enhance forage nutritional quality | -Requires moderate stocking rates (1.0-1.5 AUM’s) |
| -Diversify forage species | -Requires basic experience with prescribed fire |
| -Reduce woody encroachment; manage brush without herbicide | -Care must be taken to protect wood fence posts and gates |
| -Improve nitrogen and overall nutrient cycling | -Understanding smoke management is important |
| -Reduce biting insect populations, improving animal performance | -Access to appropriate equipment |
| -Diversify grassland habitats for wildlife | |