14 Fire and Livestock Production

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Objectives

- **Discuss the importance of fire on the land.**
- **Explain why fire frequency or repeated fires are needed.**
- **Discuss specific benefits of fire to livestock.**

Fire was a major landscape disturbance that Native Americans used to shape the grazing lands of our continent. Only one other ecological process impacts the land greater than fire — rainfall. Without fire, the land essentially can be in a fire drought, from which most of our lands are suffering, as seen by the major encroachment of woody plants. No other land management practice impacts the land greater than prescribed fire. Fire has positive impacts on soil microorganisms to plant roots underground, plus plant and animal diversity aboveground.

Prescribed fire also has a lower application cost compared to other land management options. In comparison with mechanical or chemical treatments, prescribed burning is usually the most economical way to manage native landscapes. Mechanical and chemical treatments do not mimic what fire does for the land. When lands have undergone years of mismanagement, prescribed fire alone may not be the most effective management method. If this is the case, incorporation of mechanical or chemical treatments along with prescribed fire may be needed to reclaim certain areas. Combining treatment options allows prescribed fires to be more effective. Ultimately, it is up to the land manager to choose which treatment is best suited to their goals and objectives on a particular parcel of land. Throughout the U.S., numerous studies have been completed comparing different land management techniques and the ecological impacts of those techniques. To find out which treatments would be the most effective and economical in your area, consult the local OSU Extension, USDA-NRCS or land management consultant for specific information.

One of the main reasons many people use prescribed fire is for the enhancement of livestock grazing. When properly managing grazing lands with fire, individual animal performance usually increases and possibly carrying capacity. One of the main ways this is accomplished is through the control of woody plant species that are invading rangelands throughout the country.

A significant woody plant problem that occurs throughout much of the Great Plains is the invasion of eastern redcedar (*Juniperus virginiana*). This juniper species causes many problems in the areas where it grows, with the primary problem being a drastic decline in forage production. This reduction in available forage, in turn, affects carrying capacity, stocking rate and livestock performance. In fact, a range site with a potential to produce 4,000 pounds per acre of forage, with a population of 200 eastern redcedar trees per acre would produce only 3,700 pounds of forage per acre. If that site is left unmanaged, in 10 years the site could increase to 470 eastern redcedar trees per acre and would produce less than 2,000 pounds per acre of forage. With the reintroduction of prescribed fire at two- to five-year intervals, the land could return to its production potential once again.

Prescribed burning has limitations for woody plant control, especially if the wait is too long before fire is reintroduced. Many plant species will gradually grow too

Figure 14.1. Fire frequency, or how often a place is burned, is the most important aspect of fire for the control of shrubs and trees. The pictures on the left are from southeastern Oklahoma in oak-pine forest (photos courtesy of Ron Masters) and pictures on the right are from sand shinnery oak-grassland in western Oklahoma. Both sets of pictures depict the same areas with no fire (top) and a two-year fire frequency (bottom).

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large to be impacted by typical prescribed burns. Eastern redcedar is a prime example of this. Prescribed fire has been shown to be the most efficient and economical method for controlling this invasive non-sprouting native juniper and nearly any type of fire will kill trees less than 1 foot tall. Fire fuel loading is one of the most important considerations of any burn when the objective is to control woody vegetation. Greater fuel loads will allow the burn to be conducted with safer conditions (lower temperature and higher relative humidity) and still achieve goals. While eastern redcedar trees from 1 foot to 5 feet tall can be controlled very well when herbaceous or fire fuel loads are more than 4,000 pounds per acre, if the fuel load is reduced by half, only 60% of the trees less than 5 feet tall are killed. As the eastern redcedar trees grow beyond 5 feet in height, they are even harder to control, requiring a greater fire fuel load or a more extreme burn prescription. Using an extreme prescription would mean burning with higher temperatures and lower relative humidity, which means a greater risk for an escaped fire. Therefore, maintaining adequate fuel loads through proper stocking rates is the most important part of any prescribed fire and grazing program.

Other brush species also are overtaking or invading the grasslands, shrublands and forestlands of the U.S. Most of these species resprout after a fire. Some of these include oaks (*Quercus spp.*), sumac (*Rhus spp.*), plum (*Prunus spp.*), dogwood (*Cornus spp.*) and other junipers (*Juniperus spp.*). Although these species are native, they are increasing in height, density and coverage area. Fire typically reduces the height of these plants, but increases the number of stems due to their propensity to resprout. Repeated fires will keep most of these plants suppressed or even totally remove certain species from the system.

A commonality in fire frequency has been found when comparing sand shinnery oak (*Quercus havardii*) in western Oklahoma grasslands to oak-shortleaf pine (*Pinus echinata*) forests in southeastern Oklahoma and pine forests of northern Florida. Even though these sites are hundreds of miles apart and precipitation ranges from 20 inches in western Oklahoma to more than 50 inches at the southeastern site in Oklahoma, these studies concluded that to manage woody plants and keep them suppressed, a fire return interval of three years or less should be used.

An important point to remember is that prescribed fire will not solve all land management problems, but can solve some of them. Also keep in mind that prescribed fire is not a one-time treatment. It is a program that must be continued and fire frequency is the key to success. For more information about fire effects, see OSU Extension fact sheet NREM-2877, *Fire Effects in Native Plant Communities.*

Another major benefit of using prescribed burning to increase livestock production is the increase in weight gains of stocker cattle. Studies have shown that prescribed burning increases summer stocker cattle gains by 10% to 20% in the summer following the burn. There has been little work published on the effects of prescribed fire on cow/calf operations. People who conduct research on cow/calf operations and use fire to manage their land have noted that cows can usually increase their body condition score by a factor of one over cows on unburned range and researchers have noticed a possible side benefit to calves with increased weaning weights.

Figure 14.2. Burning will cause an earlier green-up of plants following a dormant season burn, due to the blackened soil surface causing soil temperatures to warm earlier. Fire also removes the old forage growth, allowing the new growth to be utilized earlier. Fire can be used to remove old forage growth to improve the palatability and increase the nutrient content of new growth.

Burning will cause an earlier green-up of plants following a dormant season burn because the fire removes the old forage growth, allowing the new growth to be utilized earlier (Figure 14.2). Blackened soil surface causes soil temperatures to warm up earlier. Fire also can be used to remove old forage growth to improve the palatability and increase the nutrient content of new growth. An overall increase in the diversity of the plant community also is important. Fire changes the structure of many plants, which in turn increases palatability. Many times, cattle will not eat certain plants, but following a fire, the regrowth becomes highly preferred.

If certain areas within a pasture are not frequented by fire, livestock aversion to those areas may be due to old growth of grass, previous grazing patterns, topography, distance from salt or water, or type and age of livestock traditionally used. If fire is used to improve the quality and availability of the forage, then livestock should begin to use these areas again. This can improve animal performance and possibly increase carrying capacity, as well as improve forage quality and quantity of the area (Figure 14.3).

Prescribed burning generally will assist with overall land management and facilitate the best use of the land by livestock. In areas without fire, it can be difficult to observe and oversee the health of livestock because of shrub or tree cover. Some ranchers using prescribed fire noted it is worth the cost of burning just to be able to drive into a pasture and see all of their cattle. These fire effects also can be very helpful when it comes to gathering livestock. Livestock living in brushy areas often will use the dense cover to evade and escape capture. As fire opens up a pasture, livestock will have fewer places to hide.

Prescribed fire also can be used to control external parasites on cattle, such as horn flies, face flies and ticks, which have a negative impact on production. Most of the

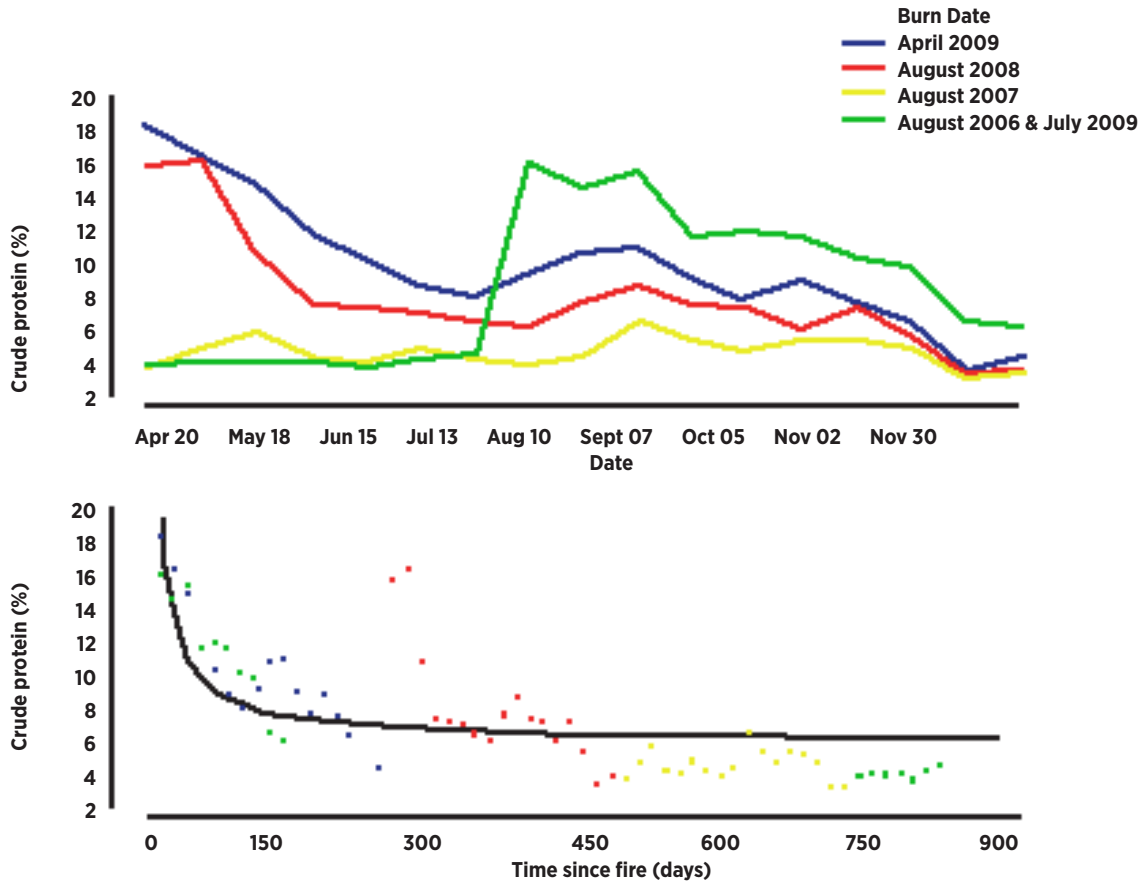

Figure 14.3. The effects of fire on forage quality (% crude protein) throughout the growing season. Recently burned areas (less than one year) contain higher forage quality. A prescribed fire in mid-July increases quality of forage, making it significantly better than other areas. This increase remains through the end of the growing season. The amount of time since a particular area has been burned determines the forage quality available to livestock.

time, the fire does not impact or kill the parasite directly, but fire reduces or destroys the habitat those parasites need for a specific phase in their life cycle. Fire also has been shown to reduce certain species of internal parasites that affect wildlife and livestock by interrupting their life cycle outside of the host. The use of fire can lower overall insecticide applications, input costs and associated losses in production in livestock due to parasites.

Finally, patch-burning and cattle production has been researched extensively. Patch-burning is the prescribed burning of an area or patch within a fenced pasture and giving grazing livestock free access to choose burned or unburned areas. Patch-burning moves fire and grazing disturbances around the landscape and causes vegetation patterns to shift through space and time. Depending on the time since a given patch has burned, the probability of grazing or burning of that patch varies due to the resulting vegetative structure. Moreover, patch-burning is different from conventional approaches to grazing management because it integrates conservation and production, which is becoming increasingly important in many rangeland landscapes. Patch-burning is a bottom-up, low-input approach totally opposite to many of the intensive grazing systems that use large infusions of fencing, labor and other inputs. For more information on patch-burning, see Extension circular E-998, Patch Burning: *Integrating Fire and Grazing to Promote Heterogeneity.*

Several important steps to be considered when conducting prescribed burns are fire plans, firebreaks, weather conditions, smoke management and the actual

Figure 14.4. There are several important steps to be considered when conducting prescribed burns. Fire plans, firebreaks, weather conditions, smoke management and the actual conducting of the burn.

conducting of the burn (Figure 14.4). Several OSU Extension fact sheets are available for more information on how to conduct prescribed burns at extension.okstate.edu. Videos are available at local Extension offices. Contact the local Extension office or Natural Resource Conservation Service (NRCS) center for more information. Additionally, many counties in Oklahoma have local prescribed burn associations. These associations help local landowners assist each other with conducting prescribed burns. To find out more or about burn associations, or to see if one is available in your area, visit the Oklahoma Prescribed Burn Association website at OK-PBA.org.

(Adapted from J.R. Weir, 2009. Conducting Prescribed Fires a Comprehensive Manual. Texas A&M University Press)