USDA-SCS Fact Sheet

# Prescribed Burning

**What:** Prescribed burning is a relatively new technique used to improve rangeland in parts of the Southwest. Prescribed burning is done just at the end of the dormant season or just at the time the desirable grasses are beginning spring growth. This suppresses certain undesirable plants thus giving an improved environment for the better plants.

**Why:** Because chemical and mechanical brush control is so expensive, ranchers have been hunting for a less expensive method. Under certain conditions, prescribed burning is a viable and effective brush control alternative that can be carried out more economically. Prescribed burning is also an effective method to improve distribution of livestock. Burning removes old growth from plants and at least for a few months reduces the animals' preference for one plant over another.

**When:** Prescribed burning should be done when it will achieve the objectives desired by the producer.

When done properly, prescribed burning produces a "cool" fire that will suppress juniper, pricklypear, tasajillo, buckbrush, dogwood, broomweed seedlings, and many other less desirable plants.

**How:** Prescribed burning is done with a combination of headfires, firebreaks, fireguards, flank fires, and backfires. A **headfire** is a fire burning with a wind. **Flank fires** burn crosswind while **backfires** burn into the wind.

A **firebreak** is a pre-burned strip around the projected downwind sides of the area to be burned. It can be created by burning between two fireguards, or by using backfires and flank fires during the prescribed burn. Firebreaks should be at least 100 ft. wide except when the area to be burned contains dry juniper. Because the dry plants are explosive, juniper firebreaks should be at least 500 ft. wide.

A **fireguard** is a strip of land where the vegetation has been removed by blading, disking, or treating with fire retardant material. Fireguards are about 10 ft. wide when bladed with a bulldozer or maintainer; they are 2 to 5 ft. wide when sprayed with a fire retardant material, depending on the height of the fuel.

**Fine Fuel:** Fine fuel is dormant grasses, forbs, and other plants that will carry the fire. Before burning, most rangeland needs to be deferred during the previous growing season to produce sufficient fine fuel that is evenly distributed.

**Weather Conditions:** Burning should be prescribed for each situation based on objectives and need. Generally, this is when wind speeds are between 6 to 15 mph and when the relative humidity is from 20 to 60 percent with the temperature ranging from 45 to 70 degrees Fahrenheit.

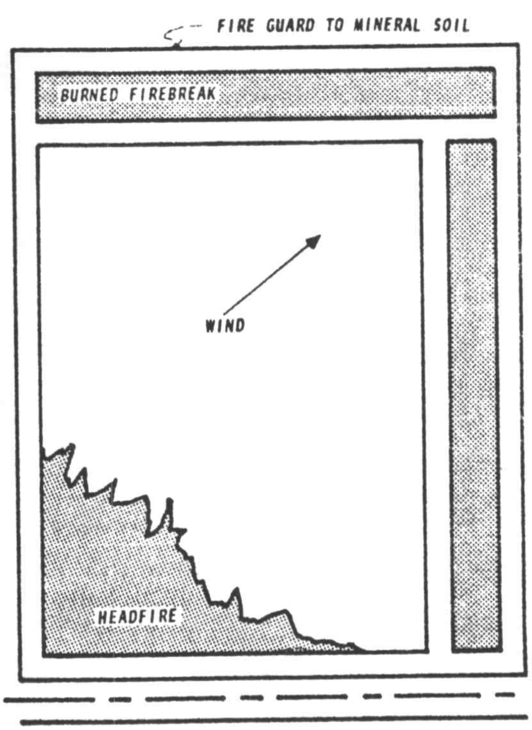
**Wind Direction:** Prescribed burns should be directed away from highways, populated areas, homes, or other places where smoke would be a hazard. Burn toward a plowed field or toward a producer's own land instead of a neighbor's.

**Topography:** This factor should be considered in designing a burn because fuel will burn rapidly uphill; a slope can turn backfires into headfires and can turn headfires into flank or backfires.

**Fire Plan:** A fire plan should **always** be worked up before the practice is carried out. Factors to be considered include the amount and distribution of fine fuel; desired weather conditions; preferred wind velocities; direction to burn; and the location of highways, buildings, and other improvements.

An actual prescription of wind speed and direction, relative humidity, and air temperature should be designated for each burn. Fireguards and firebreaks are then planned and a lighting sequence is developed for setting the fire.

**Fire Boss:** For each prescribed burn, the producer or someone experienced with carrying out the practice should serve as the fire boss. The boss coordinates the burn and tells others when to set backfires, flank fires, and head fires.




**Example:** In a typical prescribed burn, fireguards and firebreaks are installed before the burn, then a headfire is started. In this example, the fire is designed to burn away from a highway at the bottom of the drawing.

**Equipment Needed:** To plan and carry out a safe burn, equipment needed will usually include at least one or more drip torches, relative humidity gage, wind meter, spray equipment, and wet feed sacks.

**Follow-up Deferment:** After the burn, the pasture should generally be deferred for a period, depending on range condition and the producer's goals for improvement.

**Special Considerations:** When using prescribed burning on land infested with juniper or other plants high in oil, dry brush piles and large green trees should be removed near fireguards before the burn. Otherwise, they can explode and produce firebrands that can travel several hundred feet and ignite other land.

**Warning:** When the practice is not carried out properly, fire can escape to adjoining property. If smoke crosses highways, it can cause traffic accidents and death. If weather conditions are not as prescribed in the burning plan, the practice should not be carried out.

**Where to Get Help:** For technical assistance in planning and carrying out prescribed burning, contact your local office of the U.S. Department of Agriculture's Soil Conservation Service.

# What Shall We Do about Grazing Systems Studies?

**Donald A. Jameson**

There are many grazing management research questions that can only be answered by large scale grazing studies; one such question is addressed in so-called "grazing systems" research. There are two major difficulties in applying standard research procedures to such studies.

1. In a replicated grazing systems experiment with large pastures, the replication effect is usually greater than the treatment effect. Instead of having a single set of treatments which are replicated 2 or 3 times, we effectively have 2 or 3 different studies, none of which are replicated at all.
2. In years of lower than usual rainfall, fixed grazing schedule treatments with fixed heavy stocking rates must be interrupted. Only the lighter stocking rates can be applied with fixed grazing schedules in such years, and with light stocking rates there is usually no difference between different grazing systems.

Thus, two critical elements in standard experimental design, (1) replications and (2) fixed treatments, are difficult if not impossible to apply in large-scale grazing studies.

**An alternative approach is to use** sequential or adaptive methods of research and analysis. In this approach, the animals, soil, and vegetation are monitored and grazing adjustments made as needed. This is what good range managers do all the time; the problem is to see how range researchers can use these methods.

An adaptive system requires that some measurements or other observations be taken at intervals; a predictive model is used to supply information between measurements. We might not think that we are using a model, but we do. For example, suppose that we measure something about the range on June 1, and don't remeasure it until July 1. Anything that we can say about the range between these measurement periods comes from our concept or "model" of how the range will perform during this time. Although models may be very complex, the model used in this case may simply say that everything remains the same during the rest of June as it was on June 1. Without a model we would have to measure continuously to know what's going on. To keep our understanding about the range at a satisfactory level, we can use either better models or better measurements. The combination of models and measurements we call "monitoring." As a result of monitoring, needed changes in management can be made in an "adaptive management" scheme. Changes in grazing based on residual plant biomass is one example of management based on monitoring.

**The adaptive management method seems like** a good idea, but perhaps a little near-sighted if used exactly as described in the previous paragraph. Suppose we try this method to make adjustments in grazing schedules; as it turns out, the simple-minded adaptive approach is perfectly acceptable if:

1. The statistical errors in the measurements and models are not strongly skewed from a normal distribution.
2. The cost or penalty for a given degree of undergrazing is about the same as for the same degree of overgrazing.
3. The changes in plant and animal performance from an undergrazed condition to an overgrazed condition follow the same pathway (but are opposite in direction) as the changes from an overgrazed condition back to an undergrazed condition.

In pastures managed as a single species, particularly if coupled with a supplementation program, the three conditions described above are reasonable, and the adaptive approach shouldn't get us into too much trouble. Under these conditions, we can use simple observations of vegetation and animal performance to make adjustments to grazing schedules and stocking rates. In a lot of vegetation types, such as the shortgrass plains, this method will be very useful.

On the other hand, we don't have to think too hard to realize that the three required conditions for adaptive management as described above don't always apply to range-

The author is professor, Department of Range Science, Colorado State University, Fort Collins, Colo. 80523. This paper was developed from a report of the Western Regional Coordinating Committee WRCC-40. Financial support was provided by the Colorado Agriculture Experiment Station.