

Managing grazing lands with fire improves profitability: experts

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Texas Agrilife Research fire and brush control studies in the Rolling Plains on a working ranch-scale showed the benefits and limitations of managed fires for reducing mesquite encroachment while sustaining livestock production.

The head [fire](#) is set in a paddock as a part of a managed fire during the Waggoner Ranch study. (Texas AgriLife Research photo by Dr. Richard Teague)

Dr. Richard Teague, AgriLife Research rangeland ecology and management scientist, along with colleagues Dr. Jim Ansley, brush [ecologist](#), and Dr. Bill Pinchak, animal nutritionist, spent more than 10 years trying to determine how effective prescribed fire could be in reducing mesquite and cactus on the Waggoner Ranch south of Vernon.

Three major conclusions of the study were: fire is effective only at low levels of mesquite encroachment; 12 percent of the unit must be burned each year; and stocking rates should be light — 12 percent lower than the "moderate" Natural Resources Conservation Service level for the range type and range condition, Teague said.

To determine the potential of fire to reduce brush and prickly pear and how to manage the fire for maximum effectiveness, they looked at: effect of brush abundance on forage production and composition; how quickly the brush and cactus increased; treatment longevity; effect of grazing management on grass production and animal performance; and

economic returns.

A paddock the day after the burn on the Waggoner Ranch shows the impact on mesquite and prickly pear. (Texas AgriLife Research photo by Dr. Richard Teague)

To ensure effective burns, it is necessary to have approximately 2,000 pounds of fuel per acre for each burn, Teague said. In an area where plant growth and rainfall vary each year, it's most important to choose a stocking rate that allows for sufficient buildup of fuel.

Rotational grazing systems provide sufficient grass fuel and continuity of fuel for the fire to be effective and for adequate post-fire grass recovery, he said.

With three experimental treatments and two replications covering an area of about 34,000 acres, the study was started in 1995 with Hereford cow-calf herds of the same age composition at moderate stocking rates. Treatment areas ranged from 3,000-5,000 acres and three rotational grazing systems were compared under continuous grazing.

The paddock after spring green up shows how the grass recovered. (Texas AgriLife Research photo by Dr. Richard Teague)

"Fire is by far the least expensive means of reducing brush, and it should be used whenever possible to minimize the use of more expensive treatments," Teague said. "But our study suggests that fire can be used only for maintenance of low mesquite cover."

The mesquite cover studied doubled to 40 percent coverage in seven years – more than expected – and resulted in a significant decrease in forage production, Teague said.

"At that rate of increase of mesquite, if a manager starts using fire at greater than 15 percent brush cover in the first area to be treated, by the time four to five years have elapsed the brush cover would have increased to 30 to 40 percent in the areas still to be burned," he said. "This is far too high for fire to be effective."

Teague said for lowest-cost brush reduction, burning must be done regularly at six to seven year intervals.

"At levels of mesquite above 15 to 20 percent, something more expensive like root-killing herbicides is needed to restore the productivity of the rangeland," he said. "Where mesquite cover is low enough to use fire effectively, the use of fire as a follow-up to herbicide treatment would be economically superior to using herbicide with no follow-up burn."

If the mesquite cover is 30 percent or higher, forage and fuel levels are reduced so fire is less effective in reducing mesquite, Teague said. Also, with this amount of mesquite, winter grass becomes more abundant than summer grass. And because winter grasses are usually green at that time, the winter fire effectiveness is further reduced.

"This can be offset partially by burning in late summer, since summer fires are more effective in reducing both mesquite and prickly pear, and in summer, the winter grasses are dry and provide excellent fuels," Teague said.

Using a rotational grazing strategy to rest areas for an entire growing season allowed the best fuel load for the precipitation received and improved the litter and grass cover, he said. This reduced soil temperature, runoff and erosion, and increased soil carbon. Post-fire deferment also is needed to ensure adequate recovery of palatable grasses and litter cover.

Ranchers know that failure to maintain low levels of mesquite populations in pastures results in decreased livestock carrying capacity and increases the dependence on more expensive restoration practices, as well as increases the ecological impact, Teague said.

"With fire being so much less expensive than alternative treatments, our economic assessments indicate that stocking rates can be lowered by 25 percent and still be economically competitive with alternative brush treatments as long as fire is used regularly," he said.

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