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Using Forage Harvest Efficiency to Determine Stocking Rate

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The amount of forage livestock consume in relation to the total supply of forage available affects the long-term health of the plants and, ultimately, the productivity of the animals. Stocking rate determines what portion of available forage will be consumed. Therefore, stocking rate is a critical factor in animal performance, financial return and the long-term condition of the range.

The ratio of forage demand (forage needed by livestock) to forage supply is called grazing pressure. As grazing pressure increases, there is less forage from which animals can select, so individual animal performance suffers. Reduced performance, as measured by decreased weight gain and reproductive capability, translates to lower economic returns per animal. When feed is purchased to offset this higher grazing pressure, the net return per animal is even lower.

Heavy grazing puts stress on the more desirable, heavily used plants so that they do not reproduce well and may die. This makes it more likely that animals will consume poisonous plants and have nutritional health problems.

When productive plant species are lost, the lack of vegetative cover causes rainfall to run off rather than moving into the soil. Erosion and the pollution of surface water with sediment are the result. Thus, high grazing pressure, continued over several years, causes the range to deteriorate and future productivity to be lost. A ranch in this condition may not be able to survive crises caused by drought and market variability.

An adequate supply of forage is the only protection a rancher has from drought. If rangeland is stocked at carrying capacity (which causes heavy grazing pressure when forage production is low), a drought may force the sale of a large number of animals at a time when many other ranchers are also selling and livestock prices are depressed. Then, after the drought, the ranch must be restocked when demand for livestock rises and prices are high. Even in years with good rainfall and forage production the extra income from stocking at capacity is small compared to the losses that can occur in a drought.

Lower grazing pressure preserves the forage resource so that the ranch can weather such crises. In fact, most of the time moderate or conservative grazing yields better livestock productivity and financial returns over the long term than stocking a ranch at carrying capacity. Benefits include better nutrition (which results in higher calf/lamb crops), higher weaning weights, fewer deaths, and lower supplemental feed costs. In a drought, fewer, if any, animals must be sold.

Grazing Intensity and Percent of Forage Used

What is moderate or conservative grazing?

The percent of forage used is a good measure of grazing intensity. When rangeland is properly (moderately) stocked, only about 25 percent of available forage will be consumed by livestock. Of the total forage produced during the year, half should remain ungrazed to keep the plants healthy and to provide cover for the soil surface, and 25 percent will be destroyed by insects, trampling and decay. That leaves just 25 percent available for livestock consumption. With intensive management, including frequent stock rotations, it is sometimes possible to achieve a slightly higher harvest efficiency by allowing animals to consume forage before it is lost to trampling, weathering and other causes. However, a 25 percent harvest efficiency is considered a moderate stocking rate and is the level most ranchers should strive for.

50% threshold residue	25% is lost to other factors	25% of total is consumed by livestock

Figure 1. With a proper livestock stocking rate, managers can achieve a 25 percent harvest efficiency on rangeland.

For example, one Animal Unit (1,000-pound cow) consumes 26 pounds of dry forage per day.

Forage lost to insects, trampling and decay will be an equal amount. At a stocking rate of 20 acres/animal unit/year, how much total forage will be needed?

- 6 pounds forage/day/animal unit x 365 days = 9,490 pounds forage/year/animal unit
- 9,490 pounds forage/year ÷ 20 acres/animal = 475 pounds forage/acre/year

If 475 pounds of forage/acre/year is needed for livestock consumption at this stocking rate, then total forage production per acre must be 1,900 pounds annually to avoid risk. This allows for another 475 pounds lost but unconsumed, and for 950 pounds to be left as residue.

It is difficult to determine grazing intensity until the end of the grazing season when total production can be compared to the amount of forage removed during the year. But when stocking rates and grazing times are evaluated continually throughout the season by monitoring the forage supply and residue, then there is adequate time for the manager to predict forage shortfalls and make necessary adjustments before the forage resource is harmed or financial problems occur.

Through adequate planning and periodic evaluation of range conditions, forage harvest can be controlled to meet short- and long-term ranch goals and reduce risks.

Other Extension Publications

L-5400, "Stocking Rate: The Key to Grazing Management Decisions."
L-5141, "Do You Have Enough Forage?"
B-5036, "Stocking Rate Decisions: Key to Successful Ranch Management"
E-127, "Managing Residual Forage for Rangeland Health

For Further Reading

Galt, D., F. Molinar, J. Navarro, J. Joseph and J. Holechek. 2000. Grazing capacity and stocking rate. *Rangelands* 22:7-11.

Holechek, J. L., M. Thomas, F. Molina and D. Galt. 1999. Stocking desert rangelands: What we've learned. *Rangelands* 21:8-12.

For additional range management information see: http://texnat.tamu.edu

For additional risk management information see: http://trmep.tamu.edu

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