

the BASICS OF STOCKING

Of How can I graze three horses

Estimating the carrying capacity or sustainable stocking rate of a pasture must begin with understanding some very basic rules:

Rule # 1: Forage production must be greater than or equal to forage demand.

This rule is right up there with the principles of physics identified by Newton, Einstein, Planck, et al. If it is consistently violated, the system will crash, and both plants and grazing animals are likely to suffer — critters could starve, and the little piece of heaven could quickly turn into a dusty, highly erodible weed patch.

So, let's look first at the left side of the equation. What's biologically possible in Big Wonderful Wyoming?

Forage Production:

Rule # 2: Rangeland pasture production is inconsistent and dependent upon many variables.

Two variables are probably most important in determining forage production: precipitation and the composition and health of a plant community. Soil depth and texture, topography, and grazing

management are also very important. In large pastures, distance from water and steepness of slope are significant.

Rule # 3: Wyoming is semiarid, and drought happens.

Average precipitation in Wyoming varies from 5 inches per year to more than 20 inches depending on location, elevation, etc. Precipitation also varies in distribution and form. In eastern Wyoming, much of the precipitation comes in the spring and early summer in the form of rain or wet snow. In the western part of the state, a greater percentage of the annual moisture comes in the winter, often in the form of snow with lower water content. Both of these patterns favor the so-called "cool-season grasses" which generally reach their peak of production before the end of June.

Other things being equal, forage production can vary more than 300 percent between wet and dry years. Below-average precipitation years are occurring more frequently in Wyoming. In this context, relatively conservative stocking rates make sense as does an alternative feeding plan.

Rule # 4: Vegetation type, range site, and condition affect production.

Native range is more diverse but often produces somewhat less forage than introduced seeded grasses; however, all plants are limited by biological and environmental constraints.

Site characteristics, such as soil depth, texture and chemistry, and topography are very important. For example, a relatively level pasture with a deep, well-developed loam soil usually produces more forage for livestock than a pasture with steep slopes and high runoff, or a shallow, rocky, or strongly alkaline soil.



RATE CALCULATIONS

year round on five acres

The “condition” of the pasture relative to its ecological potential is significant. A pasture dominated by healthy perennial grasses, for example, will supply the needs of cattle and horses better than one dominated by downy brome (cheatgrass), tumble weeds, or unpalatable/toxic plants. With the same precipitation amounts in the following example, a pasture in “high-good” condition would produce twice as much forage as the same pasture in only “fair” condition at 1,500 pounds per acre per year vs. 750 pounds/acre/year).

Rule # 5: Take half — Leave Half.

Health and production of the grazing animals is dependent upon the health and production of the forage plants. Plants produce food via photosynthesis for their own food supply. They need a certain amount of carbohydrates, fats, proteins, minerals, etc., just as animals do. If one is lucky (with favorable weather, etc.), plants will produce a surplus of nutrients, some of which can then be safely “harvested” by plant-eating animals. However, to keep the whole system healthy and sustainable, the needs of the plants must be protected.

Abundant research has established that, in a normal year, plants need to keep about 50 percent of their tissue, especially their leaves, to produce the food they need to stay healthy. True, given available moisture in the soil and an adequate period to “rest” and recover, grasses can recover from more severe defoliation; however, the generalization holds for most pasture situations



— take half for the animal, leave half for the plant. When grazing consistently removes too much leaf material, the root system of the grass is depleted, making the plant less competitive for limited soil moisture and less able to regrow leaves or tolerate drought. When plants are over utilized, the range is opened up to erosion and/or to less desirable competitive plants. It’s a downward cycle. The poor get poorer.

It’s hard to determine what constitutes a 50-percent harvest of diverse vegetation. Many range scientists now recommend managers use “stubble height” as a measure of utilization. The



permissible level varies some with species, but a good rule of thumb is to leave a stubble about 4 inches high to maintain the health of most grasses.

Rule #6: Some forage is lost to other consumers.

One should not assume that all of the forage that disappears has been eaten by domestic animals. There are thousands, nay, billions of other consumers on an acre of pasture. These range in size from microbes, to insects, to mice and gophers, to antelope, deer, and elk. Some forage gets trampled into the dirt or blows over to the next county. Some decomposes. A lot is eaten by grasshoppers, weevils, and such. Research has shown that, on most pastures, 15 percent to 25 percent of forage is lost in this way. Intensive grazing management (high intensity for short durations) can increase harvest efficiency, but even then there are losses. In most season-long grazing situations, harvest by domestic livestock is only about 25 percent.

Forage Consumption — the other side of the equation

The amount of forage consumed by grazing animals is based on their digestive systems, their body weights, their reproductive and work status, and their behavior.

In general, ruminant animals (cattle, sheep, antelope, deer, elk, etc.) consume dry-matter forage equivalent to about 2 percent of their body weight per day. So, a 1,000-pound cow would normally consume about 20 pounds of feed per day (on a dry matter basis), and a 150-pound sheep would eat about 3 pounds of dry matter per day.

Horses, partly because their digestive system is less efficient, normally consume forage dry matter at the equivalent of 3 percent of their body weight per day. Thus, a 1,200-pound horse often consumes about 36 pounds of dry forage each day if it's available.

It's also important to note that most forages rapidly lose nutritional value as they flower and go dormant. There is an optimal grazing period for most grass species, and grazing animals need more than dry matter. Therefore, supplementary nutrients are essential on nearly all pastures for at least part of the year.

Knowing these things about forage production and animal consumption, it is possible to estimate the carrying capacity and/or sustainable stocking rate for pastures.

doing the math

A N E X A M P L E

(Please understand that pastures are unique, and your conditions are likely to be different)

Assumptions:

- Northern Great Plains native range pasture (5 acres);
- 11- to 14-inch precipitation zone;
- Loamy range site (loam soil greater than 20 inches deep);
- Low-good range condition;
- Predicted annual plant production is about –
 - 1,300 pounds per acre in a favorable precipitation year,
 - 975 pounds per acre in an average precipitation year,
 - 360 pounds per year in an unfavorable precipitation year;
- A 1,200-pound horse eats 36 pounds of dry matter per day.



Five acres of this example pasture in an average year would produce about 4,875 pounds of forage. (975 pounds forage per acre multiplied by five acres equals 4,875 pounds of forage).

Half must be left to keep the plants healthy, and 15 percent is lost to other consumers. Therefore 35 percent is available for domestic grazers. (4,875 pounds available multiplied by .35 equals about 1,706 pounds available to domestic grazers.)

This pasture can provide for the dry matter requirement of one single horse for about 47 days or three horses for about 16 days. (1,706 pounds available forage divided by 36 pounds

per day consumed by one horse equals 47.4 days forage available.)

For a six-month (183-day) grazing season, a horse would need about 6,588 pounds of dry matter and about 19 acres of the example pasture to provide it. Three horses of the same size would need three times that much feed and/or acreage for half a year.

Clearly, five acres of the example pasture cannot sustain even one horse for the long haul. The pasture must be rested, and alternative feeds must be provided.

This example dealt with small pastures and horses, but the same principles apply to larger pastures and other grazing animals.

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