Number and Size of Paddocks in a Grazing System

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Two questions frequently asked by livestock producers developing a rotational grazing system is "how many paddocks do I need?" and "how large should they be?" The answers to these questions depend on the farmer's goals, the current level of forage production, the number and size of animals in the grazing herd, the nutritional needs of the animals, and what other feeds the animals will be given while on pasture.

The number of paddocks in a grazing system determines the flexibility the manager has in controlling the timing and intensity of livestock grazing. When grazing is managed carefully, increasing the number of paddocks can increase the available forage yield per acre and animal production per acre. However, this increase is at a diminishing rate as paddock numbers increase (Figure 1).

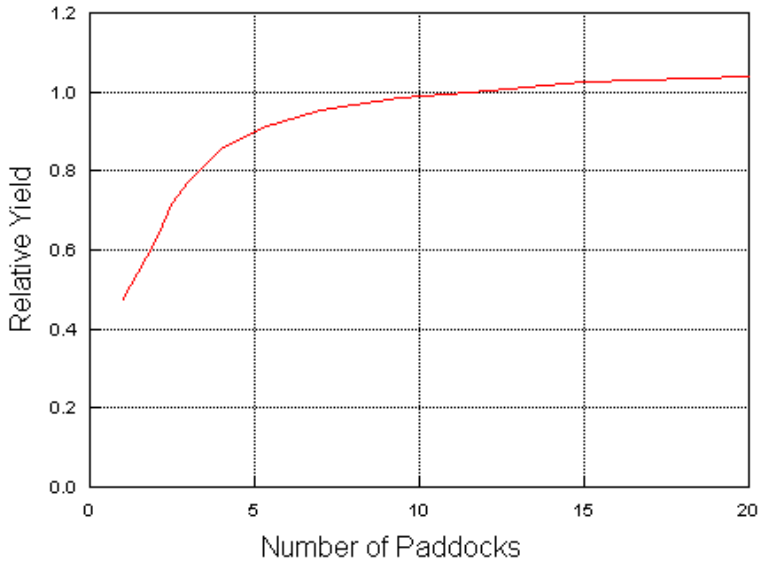

Figure 1. As the number of paddocks in a grazing system increases, pasture yield increases at a decreasing rate.

The optimum number of paddocks depends on the producer's goals, the class of livestock being grazed, and the local market and production economics. A greater number of paddocks is justified for lactating dairy cattle than beef cattle. Usually you can justify more subdivisions for stocker cattle than for a cow-calf herd. The number of paddocks in a grazing system depends on the regrowth or "rest" interval provided the pasture and the number of days the livestock are allowed to stay on the paddock. The total number of paddocks needed in the grazing system should be based on the longest regrowth interval and grazing-stay planned. This usually occurs in late summer.

The regrowth interval needed for optimum production depends on the forage species and the time of year. In the spring, grass-clover pastures need about 21 days of regrowth. This increases to 42 days in midsummer. Birdsfoot trefoil-timothy and alfalfa-smooth bromegrass pastures should have 35-42 days regrowth, depending on weather conditions.

Pastures should be grazed to the desired level using 3-7 day grazing-stay to prevent grazing of plant regrowth. A 3-day stay largely prevents regrowth grazing and may increase pasture production. The 3-day stay should be considered where economics justify the increased fencing and management input. A 7-day stay is often used by beef producers as a compromise and to simplify management. It also works well with and off-farm job that requires most management to be done on weekends. When grazing stays extend beyond 10 to 14 days, approximately half the pasture will be overgrazed and half undergrazed, resulting in poor forage utilization and regrowth.

For dairy cattle, the grazing-stay (time on a paddock) should be decreased to meet the animal’s nutritional needs. As a pasture is grazed, forage intake and nutritive quality decrease. For dairy cattle, this results in lower milk production after 3-days on a 7-day rotational system. One-day grazing stays are used by dairy producers first trying intensive rotational grazing. Many managers then go to a 12-hour stay since this provides more uniform nutrition from the pasture and requires little extra labor when using temporary fencing within permanent paddocks and the cattle need to be brought in every 12-hours for milking anyway.

The number of paddocks needed in a grazing system is equal to the number of days that a paddock will be rested, divided by the number of days it will be grazed, plus one paddock for the animals to be grazing while the other paddocks are resting. This is written as the equation:

Number of paddocks = (days rested/days grazed) + 1

Here is an example a livestock herd grazes paddocks for a 2-day stay and the pastures require a 42 day rest interval.

Number of paddocks needed = (42/2) + 1 = 21 + 1 = 22

Paddock size is determined by the available forage mass per acre before grazing and the forage requirement of the herd during the grazing-stay. Available forage dry matter (DM) per acre varies. A thick, well-managed, orchardgrass-white clover stand can provide 1500-1750 lbs. DM/acre available forage above a 2-to 3-inch stubble. Average grass-clover stands frequently provide 1000-2000 lbs. DM/acre of grazable forage in each grazing period.

Most livestock consume about 2.5% of their body weight in pasture DM daily. Dairy cattle require more feed, which is often provided as supplemental feed in the barn.

A good estimate of paddock size in acres is made by multiplying the pounds of pasture DM eaten per head per day (DM/head/day), times the number of head in the herd, times the days on the paddock, divided by the pounds of grazable forage DM available per acre (DM/acre). In equation form this is:

Paddock size acres = (DM/head/day x head x days) x DM/acre

The paddock size needed for a herd of 50, 1350 lb cows, consuming pasture at 34 lbs. DM/head/day (0.025 x 1350), grazing a pasture yielding 1250 lb grazable forage DM/a for a 2-day stay would be:

Paddock acres = (34 lbs. DH/head/day x 50 head x 2 days)/1250 DM/acre = 2.72 acres

Estimates made using these equations will provide realistic paddock numbers and size. When potential pasture production is greater than the animals' need the extra forage can be harvested from some paddocks for stored feed or for sale. Experience, common sense, and proper pasture and livestock management will allow livestock producers to make the most from their grazing system.