Dairy Cow Stocking Rates

Overgrazing leads to environmental problems:

- **Water contamination**
- **Soil compaction**
- **Erosion**
- **Weed problems**

Undergrazing also causes problems:

- **Increased need for mowing**
- **Spread of less desirable plant species**

Livestock on pasture:

- **Stocking Rate describes how much livestock a farm can accommodate given pasture availability.**
- **Animal Density describes concentration of animals on a given pasture at a given time.**

Introduction

Pasture quality is affected by soil and water availability, as well as the mix of plant species. Animal species, size, and health, as well as animal density will influence pasture vigor. Overgrazing leads to a number of environmental problems, including surface and groundwater contamination by nitrogen and phosphorus found in animal urine and feces, soil compaction, weed problems, and erosion in areas where plant material has been largely or entirely destroyed.

Pasture Mix Selection

A mix of grasses and legumes provides the best pasture quality. Legumes give the benefits of high protein and superior palatability, as well as adding nitrogen to the soil. Grasses add roughage, grow rapidly and have high yield. A mix of species also ensures that when one is not growing well, another will. 'Cool season' grasses do best in cool, wet weather, while 'warm season' grasses grow when it is hot and drier. Sod-forming grasses such as Kentucky Bluegrass will stand up to trampling better than bunching grasses such as Timothy. Appropriate pasture management practices usually improve a poor pasture without the need to resort to total reseeding. A poorly growing weedy pasture will support fewer animals than a healthy pasture containing a variety of nutritious grasses and legumes.

Rotational Grazing

It is important that all pastures be given some "rest" time. Ideally, animals would begin grazing a pasture when plants are 6 to 10 inches tall and be removed when plants are no less than 3 inches tall. These heights are somewhat dependent on forage species. The vegetative period of growth of a species is the ideal time for grazing. Overgrazing can cause muddy conditions and soil erosion, killing desired pasture species and allowing for the introduction of weeds that tolerate compacted soils. On hilly land especially, rainwater runoff high in nutrients from animal feces and sediment will cause downstream pollution. Undergrazing is also undesirable as animals are likely to graze selectively, allowing less desirable plants to outcompete desired ones. Undergrazed pastures require more frequent mowing to keep undesirable plants in check, and especially to keep those plants from going to seed and spreading further. Subdividing pasture and rotating animals encourages livestock to eat a wider variety of plants. To maximize grazing efficiency, use a very high animal density for a very short time (intensive grazing). In a large pasture, animals have more grazing options and can be very choosy in plant selection. Pastures will recover when animals are moved elsewhere, and when necessary, mowing can be used to eliminate tall weeds when animals are moved out. Ideally, at least four pastures should be considered in rotational grazing. Pasture recovery typically takes from 2 to 6 weeks. Rainfall, temperature, soil fertility, and grazing intensity influence rate of pasture recovery.

Water for Growing Forage

Annual and seasonal rainfall patterns affect pasture growth, potential soil erosion and runoff problems. In general, greater rainfall during the growing season means more pasture growth. Most areas in Massachusetts receive about 45 inches of precipitation annually. Variations in soil water holding capacity based on texture, structure, and depth

generally have more effect on pasture growth variation within the state than rainfall variation does.

On average, rainfall does not vary much among the grazing months of May through October. However, light intensity and duration as well as temperature variation influences growth of pasture plants. Excessive heat causes drying conditions. Pastures require constant monitoring.

Water for Drinking

Drinking water access is an important consideration in creating pasture subdivisions. It is most convenient not to move watering facilities, but rather to subdivide pasture such that the same watering facility can be accessed from several pastures. The down side of this is that animals will always be gathering in a single area which may lead to muddy conditions. If the area is not flat, soil erosion and nutrient runoff will also occur. A wheeled watering unit makes it easier to move the water and reduce mud. Note that if livestock are watered at a stream, and drink from the same location for extended periods, this can lead to mud and erosion problems as well as downstream pollution. Regular watering of animals at streams is almost never appropriate.

Stocking Rates

USDA defines one thousand pounds of live weight as one animal unit (AU). Animal Density (AD) is defined as (AU)/grazed acre. Stocking Rate is a function of animal density including consideration of percentage of the time the animals are on the pasture. A general starting ratio for stocking is 0.5 (500lbs of animal grazing per acre). A Jersey cow might be as much as one animal unit (1000 lb), so 2 acres of "average" pasture would be recommended per cow. Five to fifteen sheep or goats might also constitute one AU. Specific starting points for stocking rate vary according to the quality of the pasture. For example, 20 acres of "average" pastureland could support ten 1000 pound cows at a stocking rate of 0.5. Subdividing the 20 acres into four-5 acre pastures, rotating the pastures, and maintaining them well, would allow you to keep more than 10 cows on these pastures. Rotating 12 such cows on four 5 acre pastures would give an Animal Density of 2.4, with an overall stocking rate of 0.6 since the cows are only grazing a pasture ¼ of the time. Note that animal density should be much higher than 0.5 if animals are only grazing the pasture a fraction of the time. Use the following table to help adjust stocking rates to your own situation.

Decrease stocking rate if:	Increase stocking rate if:
Poor pasture quality	Excellent pasture quality
No pasture rotation	Rotating several pastures
Stony, ledgy hillside soils	Well fertilized land with low erosion potential
Regrowth is abnormally slow	Animals are given supplemental feed
Low rainfall or excessively drained (i.e. dry) area	Animals are avoiding species you would like them to eat

In general the higher the AD, the more intensive the pasture management required.

In order to preserve pastures, there are times when livestock should be removed. When the soil is wet, as it is for a period every spring, and livestock are outdoors, it is necessary to have an area which is well drained and flat for them to stay. This is often called a "sacrifice area" because plant growth in this area has been sacrificed. This area should be convenient to water and shelter. A small sacrifice area can save a large pasture.

Resources

Rainfall data: Massachusetts Department of Conservation and Recreation www.mass.gov/dcr/

Massachusetts Department of Agriculture Resources. 251 Causeway Street. Suite 500. Boston. MA 02114. Phone (617) 626-1700. Website: www.mass.gov/agr

USDA Economic Research Service www.ers.usda.gov/

New England Small Farm Institute www.smallfarm.org/uploads/uploads/Files/StockingRates.pdf suggests a stocking rate of 1 acre rather than 2 acres per one animal unit (1000 lbs). This assumes well managed pasture on high quality pasture land.

For more information visit www.umass.edu/cdl

Factsheets in this series were prepared by, Masoud Hashemi, Stephen Herbert, Carrie Chickering-Sears, Sarah Weis, Carlos Gradil, Steve Purdy, Mark Huyler, and Randy Prostak, in collaboration with Jacqui Carlevale.

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