

MANAGING FOR A YEAR-LONG FORAGE SUPPLY Lesson 6

Introduction

Forages make up a large portion of ruminant animal diets. Nationwide 75 to 90% of all feed consumed by beef and sheep is forage. In addition, a survey of beef producers revealed that producers who grazed cattle longer during the year had lower costs of production compared to producers who fed more harvested forages. Thus, the longer we can keep animals out on pastures harvesting their own forage, the greater the opportunity to keep production costs down.

For planning purposes, break the grazing year up into three grazing seasons: spring and early summer (May and June), mid-summer (July and August), late summer and fall (September and October until we can no longer graze). In addition to the three grazing seasons, we must also consider producing hay for winter-feed.

In Maine, many perennial pastures consist primarily of cool-season grasses (bluegrass, quackgrass, fescues, timothy etc.). These grasses produce most of their growth in spring, grow slowly during mid-summer, and if rainfall is adequate produce moderate amounts of forage in late summer and early fall. This uneven forage growth tends not to meet forage needs of livestock throughout the growing season.

How do we manage pastures to supply forage for as long as possible during the year and produce adequate amounts of hay? **It takes planning.** To maximize the amount of time animals graze pastures, the most critical period is mid-summer. Supplemental pastures during summer can supply forage when forage is normally limiting. Furthermore, the use of supplemental pastures allows cool-season pastures to rest during mid-summer. This gives cool-season pastures time to regrow and accumulate (stockpile) forage for late summer or fall grazing. In addition, by resting cool-season grass pastures during mid-summer, those plants will be more vigorous and regrow more rapidly when grazing resumes. This lesson will focus on why management during the mid-summer period is so important for extending the grazing season. It will also provide management options for supplying adequate amounts of high quality forage during fall and for managing a productive hay program.

Management effects on plant growth

Normally in spring, pasture growth keeps up or keeps ahead of grazing animals. Under continuous grazing or high stocking rates, once summer comes and pastures get grazed down, they never seem to quite recover. This is for a reason. One must remember that half of the pasture is beneath the soil (the roots). When a plant is grazed, the plant tops (leaves) are removed. What we sometimes don't think about is that those leaves are feeding the whole plant (from the sun by photosynthesis). The plant compensates for top removal by sloughing off roots. Although it is a generalization, we need to think that what is going on above ground with our pasture plants is also going on below

ground. When plant tops get shorter because we graze them, plant roots also get shorter. If plant tops are kept short, plant roots will also be short. A short root system can't explore very much of the soil for moisture or nutrients. When soil starts to dry, it does not take very long before the dry line in the soil is deeper than the plant roots. Even if fertilizer is applied, once nutrients are out of the relatively small rooting zone, the plant cannot get any more. Even when it rains, these plants are not as vigorous and cannot regrow as quickly. By letting pastures rest between grazings, plants can grow tops, which will help them grow more roots. This will then help them to explore more of the soil for water and nutrients, allowing the plants to grow more quickly after grazing. These are some of the reasons why rotational grazing helps pastures be more productive.

Rotational Grazing

Rotational grazing, management intensive grazing, and Voisin grazing are terms that describe a system of grazing where animals are introduced to new feed on new paddocks on a frequent basis. Animals are confined to relatively small paddocks to maximize efficiency in grazing. In this system, high quality forage is rationed out to meet livestock needs, while plants that have recently been grazed are protected from being eaten again until they have adequately recovered. By managing animal access to forage, you are managing plant growth and plant health. The factors that you control that are important to a successful rotational grazing program are intensity of grazing, duration of grazing, resting or recovery period, and size and number of paddocks.

Intensity of grazing:

Intensity of grazing is the term pertaining to the amount of the forage mass removed or grazed from a pasture during the grazing period. Grazing should start in a paddock when vegetation is about 8 inches high for tall growing species such as orchardgrass, brome grass and reed canarygrass and 5 to 6 inches high for timothy and lower growing plants like bluegrass, redtop, fine leafed fescues and white clover. Animals should be removed when the forage height is reduced to 2-3 inches. One exception to these height recommendations is the first time a pasture is grazed in the spring. Grazing should start when new spring growth reaches 3 inches in height and grazed until the height is 1.5 inches. Move the animals rapidly through all the pastures to establish a staggered forage regrowth pattern necessary for the rest of the grazing season. Another exception is when soils are so wet that punching is a problem. Delay grazing until the soils are dry enough to support the weight of the animals without punching. Charts are available to determine how much forage is available from a pasture (See Lesson 1, Appendix C).

Duration of grazing:

The length of time that animals have access to an individual paddock is referred to as the residency period. The residency period should be as short as possible to prevent animals from grazing regrowth. Plant regrowth may begin in 3 to 4 days in May and June but may not begin for a week or longer during July and August when the weather is hot and dry. The more often livestock are moved to fresh grass, the more uniform the quality and quantity offered. Lactating dairy cows should be provided with a fresh paddock after each milking for optimum milk production, but could stay in one paddock for up to 3 days. Beef cattle, heifers, dry cows, and other animals can graze on a single paddock for 3 to 4 days, but no longer than 6 or 7.

Resting or recovery period :

The interval of time a pasture is allowed to regrow after grazing is the resting or recovery period. This resting period is crucial for high forage production from pastures. The frequency at which a pasture is grazed controls the quality and quantity of feed that is produced. Pasture growth rates are always in a state of flux. Pasture growth rates are very high in spring and early summer. During the heat of summer, pasture growth rates tend to be the lowest. Thus the resting or recovery period will vary with the seasons. Pastures should be grazed as often as every 10 to 15 days in the spring, 15 to 20 days in late spring and early summer, and 25 to 30 days during summer and fall.

Size and number of paddocks:

Forage production, number of animals, and length of residency period are all used to calculate size of paddocks. Forage production values for different soils are available from local NRCS offices. Paddock number is dependent on how frequently animals are moved. The more frequent animals are moved the greater the number of paddocks that are needed. 12 to 36 are needed in spring and midsummer and 24 to 84 are needed in midsummer to fall. In actual practice, farmers must make day to day decisions about adjustment to the rotation lengths and paddock size and number. Portable electric fencing makes adjusting of paddock size and number easier. Contact your local office of the University of Maine Cooperative Extension or the Natural Resources Conservation Service for help in setting up a rotational grazing system.

However, even with rotational grazing, cool-season plant growth is slow during summer and pastures may not produce adequate supplies of forage. Often in July and August animals are grazing whatever they can find.

How do we manage to have enough high quality forage available from July through fall? To accomplish this, cool-season pastures need to be destocked after spring (less animals per acre or longer rotation lengths because less forage per acre is being produced). How do we go about destocking? There are several ways to do this. One is to stock pastures lightly. Forage growth will get ahead of grazing animals in spring, but animals will be able to selectively graze and there will be more forage for later in the growing season, although it will be of lower quality. This is a viable option for some livestock operations. However, animal production per acre will be below its potential.

Another approach to destocking pastures in summer is to make hay on some pastureland in spring and then use those fields for grazing in summer. This results in more acres for grazing during summer (destocking). This system allows for both hay production and for extra pasture during slow growth periods.

In beef systems you can over-winter calves, graze them the following spring, and move them to a feedlot or sell them as plant growth slows. This option has to be weighed against the cost of feeding animals over winter.

Another way to destock pastures is to remove animals altogether. Using more than one type of forage crop for pastures may give the best chance of supplying adequate amounts of forage season long. The following will discuss several alternatives for additional crops and management strategies for pastures.

Alternative forage management strategies for summer forage

Summer annuals

Summer annual grasses such as sudangrass or pearl millet can offer an option for mid-summer pastures. They also produce lush, vegetative growth during mid-summer, and are therefore a good complement to cool-season pastures. **However, summer annuals can be expensive, as a result of annual seeding.** Good management including rotational grazing and/or staggered planting dates are needed to make summer annuals economically viable. The sudangrasses (and all sorghum species) can cause prussic acid poisoning if grazed after a killing frost. Pearl millet will not cause prussic acid poisoning. As a general rule, pearl millet produces better on lighter soils and sudangrass better on heavier soils.

Summer N fertilization

Soil fertility on pastures is often overlooked as a management tool to increase summer forage production. To determine fertility needs, a lab should test soils, which can make fertility recommendations for your soil and climate. Contact your county Extension office or local NRCS office for information on soil testing and manure testing.

Nitrogen fertilizer will increase plant growth. In many instances N is applied to pastures in spring. If the pastures are harvested for hay, this is a way to increase hay production and may be a viable option. However, under grazing systems, forage is often in abundant supply in spring, so additional growth at this time may not be efficiently used by grazing animals. This can result in poor return from money invested in fertilizer. It may make more sense in a grazing operation to apply fertilizer in June. This way the additional forage production will occur in mid-summer, when additional forage is needed. The carrying capacity of the cool-season grasses is greater in mid-summer when N is applied later in the growing season.

How much fertilization can be profitably applied to pastures can be difficult to determine. Growing more grass does not make fertilization profitable. Remember, for every dollar spent on fertility (or any input), more than one dollar must be made in return. Therefore, fertilizing to grow more forage in the spring and letting that forage get too mature and lower in quality is not profitable. Nitrogen should only be applied to grass if additional forage is needed. Because most pastures are under-used in spring and over-used in summer, one application of 50-80 lb. N/ac. in mid-June to mid-July may be the most profitable in many pasture systems.

One thing to consider with N fertilization is that N can be applied to pastures in several forms. Supplying N to pastures by growing legumes or with animal manure can be an excellent option. Legumes can provide 80-100 lb. N/acre to grasses in a pasture. In addition, over 80% of the legume N grazed by livestock are returned to the pasture through manure and urine.

Forage Legumes in Grass Pastures

Legumes benefit grass pastures by providing N to the grasses, by improving the distribution of forage growth through the grazing season, by increasing animal intake, and by improving animal performance. Clovers can make pastures more productive.. To effectively use and maintain legumes in pasture systems, good pasture management is critical. Special attention to soil fertility and grazing management is needed to maintain legumes in pastures.

Forage legumes offer a number of advantages for pastures. However, there are several challenges for using legumes in pastures. Legumes can have poor persistence (particularly under continuous grazing) and low tolerance to poorly drained soils and low soil fertility. In addition, many legumes can cause bloat. As such, grass/legume mixed pastures are easier to manage than legume monocultures, and therefore may be desirable for pastures. Common legumes grown with grasses for grazing in Maine are alfalfa, red clover, ladino or white clover, and alsike clover.

Strategies for fall forage

Stockpiled cool-season grass pasture

Stockpiling forages is done by removing animals from a pasture at some time during the growing season and letting forage accumulate for later use. It is commonly done in the late summer to provide fall forage which can be grazed after killing frosts. Stockpiling cool-season grass pastures can supply forage for fall grazing. The grasses that dominate many pastures in Maine generally produce most of their seedheads by early July. Therefore, if stockpiling is initiated after early-July, the majority of the forage available will be leaves. Leaves are more readily eaten and are higher quality than stems. However, the quality of cool-season grasses declines quickly as they go dormant. Thus, the quality of stockpiled forage tends to be relatively low. Therefore, fall stockpiled forage is probably best suited to dry pregnant cows and ewes as opposed to growing or lactating animals. If the amount of land for pasture is limited, then stockpiling forage is not a good option since some pastures will have to be taken out of production in early fall when forage is already in short design.

Making cool-season pastures available for stockpiling in mid-summer can be a challenge. On most farms, all available acres are needed for summer grazing. To make stockpiling work on a consistent basis, consider some of the summer forage alternatives discussed previously.

Brassicas

Brassica crops include turnips, rape, typhon, kale, etc. The primary advantage of these crops is that they remain green and lush in the fall after most forage crops go dormant. Thus, they can produce good animal gains on pasture at a time when other forage crops are relatively low quality. However, animal performance when grazing brassicas has been highly variable. In the literature, gains with growing lambs have varied from 0.04 lb./hd/day to 0.74 lb./hd/day. However, average daily gains have generally been higher for lambs grazing brassica crops than for lambs grazing stockpiled tall fescue or orchardgrass.

The reason for the inconsistency in animal performance while grazing brassica crops is not well understood. Several management strategies can be used to try to minimize the variation in animal performance while grazing brassica crops: 1) allow the animals to become adjusted to the brassicas gradually, and 2) supply dry hay to animals grazing brassica crops. Brassicas should be tried first on a trial basis.

Alfalfa regrowth

Alfalfa can be an excellent option for high quality forage in early fall. Research is being initiated on the effect of grazing alfalfa hay fields in the early fall (when it is not normally recommended to harvest alfalfa for hay). Preliminary observations imply that moderate fall grazing does not stress plants as much as cutting for hay. Therefore the risk of winter injury may be less when grazed in fall than when cut for hay. If this is true it may open up some opportunities for grazing late-season alfalfa regrowth. There may be some problems with bloat in ruminants grazing lush pastures of alfalfa or clovers and colic in horses.

Managing a successful hay program

Similarly to planning for grazing, the key to a successful hay program is planning. Did you produce enough hay last year? Was the quality what you wanted? How and where will you grow enough hay to get through next winter? To start the planning process, list the acreage in each field you use for hay production. Then, estimate last years production as tons of hay per acre. The kind and variety of forage and the fertilization of each field during the past year is also important. Estimate the amount of stored forage you will use this winter. Finally, make a list of practices or changes you can make to help you achieve your production goals for next year. This section will discuss some management ideas for a successful hay program. Before we start there are two points to consider: 1) it costs little more to produce good hay than poor hay, and 2) forage plants are generally higher in quality when young than when mature (corn silage excluded).

The basics of growing ample amounts of high quality hay are to harvest at the proper stage of maturity and follow a good fertility program. The proper stage of maturity usually means when an acceptable compromise between yield and quality is reached. It is generally recognized that harvesting alfalfa between bud and early bloom and grasses at the boot stage are good benchmarks for getting both high quality and good yields from a hay field. However, depending on what species of animal(s) you are feeding, as well as their stage of production, proper harvest stage may change to meet your goals.

If you have a pretty good idea about the stage of maturity at which you want to harvest your forage, the next step is to grow the amount of forage you need. To target production, start with a soil test. If you have not soil tested your hay fields in the last 2 years, it is time to do so. Otherwise you don't know if low fertility or low pH may be limiting forage growth. Follow the soil test recommendations by applying the needed nutrients. A primary reason for lower than desired hay yields is low soil fertility. However, when applying fertilizer keep in mind the golden rule of forage production, "for every dollar you put into a fertilizer program you must make more than a dollar back". If your yield goal is 2 tons of hay per acre, there is no need to fertilize for 5 tons of hay. Keep fertilizer and production records to help determine if extra inputs are profitable!

If other nutrients are not limiting plant growth, applying nitrogen to grass pastures will grow more forage. Yield response from additional nitrogen depends on many factors, including current soil fertility, soil type, rainfall, etc. Often forage yield can double with as little as 50 lb. of N/ac. However, if forage gets overly mature after N fertilization, you have only grown more poor quality hay. This will probably not be a profitable use of your fertilizer dollar. We rarely have a shortage of poor quality hay, but we can almost always use more high quality hay.

One way to get the additional N to pastures is by the inclusion of legumes. Legumes add N to pastures, increase productivity and intake potential of grass pastures, grow more during the summer than grasses, and are high in protein without N fertility. Legumes, however, have higher fertility requirements than grasses and low flooding tolerance.

One way to get the best of both legumes and grasses in a hay pasture is to plant them together. Management of mixed pastures takes skill. A grass/legume mix harvested at the proper stage of maturity can produce high quality hay. Keeping good records of acreage, production, and cost can provide valuable information when considering interseeding legumes into grass pastures in the future. Advantages of a grass/legume mix for hay production over alfalfa alone include reduced drying time and lodging, decreased winter injury, reduced weed encroachment and soil erosion, and longer stand life. However, legume persistence has been a problem in both pastures and hay fields. Good harvest management, including not harvesting in the fall and a good fertility program can make for a successful grass/legume hay field.

The real benefit from a good hay management program is reducing your feed cost. Therefore, keep in mind when making hay that you are using that hay to feed animals. Higher quality hay can help meet the nutritional needs of animals with less supplementation (less cost). Have your hay tested and feed higher quality hay to animals with higher nutritional needs and lower quality hay to animals with lower nutritional needs. Knowing and understanding the nutrient requirements of animals for the stage of production they are in will help avoid over- or under-feeding.

There are several management steps to consider as you plan a hay program. These include:

- 1) Target the yield and quality needed from your hay fields
- 2) Soil test and apply nutrients as needed to meet your yield goals, and consider using legumes as a source of N and high quality forage
- 3) Harvest at the proper stage of maturity
- 4) Forage test to better allocate your hay supply.

There are many things to consider when evaluating a forage program. Review your system and visit with your local extension educator if you have any questions.

In this article there have been several options discussed on how to maximize the time animals spend grazing during the year, as well as planning hay production to meet your goals. There is not a single best system for all farms. Consider some of the options suggested, consider when you have forage shortages and excesses, and see what kind of forage management program you can put together. By diversifying your pasture system, you can reduce the impact of seasonal weather and growth fluctuations and give yourself the best opportunity to have abundant amounts of high quality forage available throughout the year.

The following questions are geared toward helping you develop a pasture management system for your operation!

- 1) How will you manage your farm to efficiently utilize early spring growth?
- 2) How will you manage to supply adequate forage availability during summer?
- 3) How will you manage to supply adequate forage availability during fall?
- 4) In the winter, how will you manage to meet nutritional needs of cattle at the lowest possible cost?
- 5) If pasture renovation or reseeding is in your plans, identify potential species for forage production. (remember to take into consideration soil type, drainage, etc.)

References

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Greg Cuomo, West Central Research and Outreach Center*

Edited for Maine conditions by Paul Hughes, State Agronomist, NRCS

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Lesson 6 Quiz: *Managing for a Year-Long Forage Supply*

- 1) What are the three grazing seasons in Maine?
 - a) _____
 - b) _____
 - c) _____

- 2) When trying to maximize grazing time on pasture, what is the most critical management period? _____

- 3) T or F: Leaves feed the whole plant through photosynthesis.

- 4) T or F: When plant tops get grazed short, roots tend to grow deeper.

- 5) Name 2 destocking approaches for summer pastures.
 - a) _____
 - b) _____

- 6) In a rotational grazing system, what are the four factors that you can control to maximize forage productivity from pastures?
 - a. _____
 - b. _____
 - c. _____
 - d. _____

- 7) What are you really managing in a rotational grazing system?

- 8) What are three alternative management strategies for summer forage?
 - a) _____
 - b) _____
 - c) _____

9) Give two reasons why stockpiling cool-season grasses for fall forage generally is not a good option?

10) Name three ways legumes can benefit a pasture?

- a) _____
- b) _____
- c) _____



Name _____ Phone _____

Address _____

(Optional) FAX _____ E-mail _____