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MAINE PASTURELAND MANAGEMENT

At first glance, pastureland and agriculture, specifically the growing of a crop, do not seem closely related but they are. When you think about it though, pasturelands are intended for the growing of plant materials (a crop) used to feed animals, most of which in turn provide food or fiber for human beings. A few pastures are used for feeding animals used mostly for recreation or work such as horses, mules or donkeys.

While it is possible for owners of grazing animals to raise them entirely on feed materials brought in from other areas, most want to use pastureland, at least seasonally. Not only do pastures provide relatively low cost feed for the animals, they also provide an area for the animals to exercise in, and, some people believe that grass fed animals are healthier to eat than grain fed animals. It is also possible to manage for specific kinds of plants in a pasture to provide animals with important nutrients or health benefits. On the other hand, poorly designed or managed pastureland can make it difficult for animals to get the nutrition they need, requiring their owners to truck in costly supplemental feeds. In Maine, there is a law requiring animals that use pastureland to have some kind of cover for the animals to use when the temperatures are very hot (shade) or cold and windy (shelter). While this can be provided by a building or roofed area, an inexpensive method of providing shade and shelter is to include some forest land in the pasture or to plant trees specifically for that purpose. Planting trees in a pasture can provide an added benefit to the landowner by providing another source of income when the trees mature and are harvested. This practice is called Agroforestry and is defined as “The intentional integration of trees and shrubs into crop and animal farming systems to create environmental, economic and social benefits”. Planting trees not only provides shade for grazing animals, but can also provide shade for the herbaceous crop. Too much shade may cause the grazing plants to die off but some shade can help them in times of stress due to heat, particularly on excessively well drained soils. Trees can also reduce soil erosion, particularly on steeply sloping pastureland with sparse vegetation, by slowing down the impact of raindrops on the soil surface and their roots hold soil in place. Trees can also provide valuable wildlife habitat including food and improve recreational opportunities on those lands open to the public when not being grazed upon and that do not have permanent fencing.

As is true for all types of agriculture, soil type has an influence on the quality of pasture potentially available on an area of land. Generally, prime farmland soils; those soils that are the best available in a state, are not used for pastureland. Most of the time, prime farmland soils are used to grow commercial crops or high value feed crops such as corn or soybeans. Prime farmland soils are also the most suitable for urban development and many are converted to high value housing developments. The soils or lands with some limitations for row crop agriculture are the ones most frequently used for pastureland. These soils may be on slopes where erosion is a concern with row crops, have lots of stones on the surface or in the soil making plowing difficult, have limited depth to bedrock or hardpan, they may be droughty (sandy, gravelly or shallow to bedrock) or too wet to plow. Whether a pasture has prime farmland soils or soils with some kind of limitation, use and management is critical to the quality of forage provided.

Use and management will affect soil health over time which will in turn affect the productivity of the soil. A healthy soil is one that supports a variety of life within and on it. Activities which affect a soil's ecology will affect its health. These can include:

1. **Compaction** (soil structure and consistency) – if a soil is compacted it will lose some or all of its pore space, which is where air and water are stored and pores are the pathways for plant roots. In addition, compacted soils do not allow rain water or snow melt to enter into them, causing the soil to be very dry and for more runoff which can lead to soil erosion. Pastures where grazing animals spend too much time or at the wrong time of year (when the soils are wet and soft so they easily rut and compact), can become compacted and suffer a decrease in quality. Rotational grazing is a good way to prevent over compaction of soils in a pasture by grazing animals. This is done by the use of portable fencing where grazing animals are put in small pastures for short periods of time and then rotated into new pastures frequently. Small pastures work well so that all of the forages are grazed but not overgrazed. Overgrazed plants become stressed easily and may die or reduce production. In large pastures where animals are pastured for long periods of time, grazing animals tend to concentrate in certain areas where preferred forages can be found causing overgrazing of those areas and soil compaction. Compaction can also be caused by repeated vehicular traffic or traffic when the soils are wet. Vehicular traffic might be work vehicles such as tractors or trucks or recreational vehicles such as ATV's.
2. **Organic Matter Content** – healthy soils require organic matter in them, particularly the upper most soil horizons. Organic matter is the source of food for many soil microbes and it aids in the formation of granular soil structure which is the source of porosity in most soils. Organic matter also absorbs and holds onto water and nutrients for plants and soil microbes to use when needed. Soils with low organic matter content do not make good pastures. Grazing animals do their part in adding organic matter to pastures they feed in by depositing manure. It is a good idea to do soil tests in all pastures to check for soil pH, nutrient and organic matter levels.
3. **Soil fertility** – pasturelands are crop lands. The crop is usually grass or other herbaceous plants which are harvested several times a year. If important nutrients are missing or in short supply, pastureland plants will not thrive and their nutrition levels will decline causing grazing animals to be deficient in them unless provided in supplemental feed. If you take from the land, it is necessary to give back from time to time. Spreading manures on pastureland is a good way to provide both organic matter as well as nutrients. On the other

hand, over fertilizing and/or fertilizing at the wrong time of year can cause groundwater and surface water contamination. Ideally, fertilizers should be applied when the plants growing in pastures can use them. This is especially true for nutrients that are highly leachable such as nitrogen. Soil particles are negatively charged so they readily adsorb positively charged nutrients such as phosphorous. Nitrogen however, is negatively charged so it is repelled by negatively charged soil particles and therefore leaches away. How quickly the nitrogen leaches away depends on a number of factors such as time of year (temperature and plant growth), soil texture and consistency, precipitation amounts and duration, the form of nitrogen used (some forms evolve as a gas). Grazing animals replace some of the nutrients removed as a result of their grazing by depositing manure and urine. It is a good idea to do soil tests for all pastures to check for soil pH, nutrient and organic matter levels.

4. **Hydrologic Modifications** – Actions which affect the natural hydrology can be beneficial or detrimental to the quality of a pasture. If a pasture is located on an area with wet ground, its quality may be improved by activities which dry up the soil. Pastures on wet soils can't be used when the soils are saturated as they will be rutted and compacted easily then. Drying up wet soil will also allow for the pasture to be used longer during the growing season. On-the-other-hand, if more water is added to a pasture (by a ditch outlet, culvert or diversion), their soils may become wetter limiting the time of year when they can be used and affecting the type of plants that can grow in them.
5. **Chemical Use (Pesticides)** – Pesticides are rarely used in Maine pastures so they do not usually pose an environmental threat to soil and/or water quality.
6. **Soil Erosion** – If a pasture has sparse vegetation or bare spots, particularly if the soils in the area are compacted and the land surface is sloping, runoff water can cause soil erosion. Soil erosion is a threat to pasturelands because of the loss of topsoil, the most productive layer of soil for growing forages. One of the more common places that soil erosion occurs in Maine pastures is along stream banks. Grazing animals are drawn to the stream in order to access drinking water, causing erosion of the stream bank. The steeper the banking, generally, the more significant the erosion problem is. Stream bank erosion is also more severe on some soil types than others. Silty or clayey soils are more prone to erosion by grazing animals than soils with stones in them or that are coarser in texture. Also, wetter soils are more prone to stream bank erosion than dryer or more well drained soils. The eroded soil from stream banks then becomes a pollutant in the stream.
7. **Soil pH** – Soil pH is a concern in pasturelands as it affects the types and vigor of plants growing. In Maine, because we have more precipitation than evapotranspiration, our soil tends to become acidic over time. In the west, where there is more evapotranspiration than precipitation, salts are brought up to the ground surface raising the pH so that soils become basic. It is important to do periodic soil tests in pastureland to maintain a soil pH as near to neutral as possible, 7.0, as well as to test for nutrient and organic matter levels.
8. **Pasture Location** – It stands to reason that pastures located close to the barn tend to get the heaviest grazing use due to convenience. This can cause significant compaction and rutting. High animal foot traffic also leads to more bare soil which causes increased runoff and which in turn increases the potential for soil erosion. In addition, the concentration of grazing animals in a pasture or a section of pasture can lead to over fertilization by the continual deposits of animal manure and urine, impacting groundwater. During spring

runoff and after significant rainfall events, some of the excess nutrients can wash away from these pastures and into a nearby waterbody. It is also understandable that farmers tend to spread the most manure from their winter storage piles or pits in pastures closest to the barn where the manure piles or pits are located. This can cause those pastures to be over fertilized, impacting ground and/or surface waters.

It is important to remember that pastureland is cropland. You only get out of it what you put into it. A well-managed and maintained pasture will be productive and support healthy grazing animals. Poorly managed pastureland will not be very productive and will not support grazing animals without supplemental feeds. Farmers need to have a basic understanding of their soils in order to properly manage them. Excessively drained sandy or gravelly or shallow to bedrock soils will require different management techniques than silty or clayey soils with a high seasonal groundwater table. The excessively drained pastures can be grazed early in the spring or late in the fall when the clayey soil pastures are too wet to graze but they will not be good pastures in the summer unless organic matter is added periodically to hold onto moisture and nutrients. The wet clayey soil pastures become valuable in the middle of a hot and dry summer when better drained soil pastures dry up. A farmer may be interested in wildlife and manage some of his/her pastures to support wild animals and birds. If a pasture is allowed to have the forages mature, it can be used for hay after song birds that nest in them have hatched and fledged their young. Then, the pasture can be used for grazing the rest of the growing season. Clover and fruit or nut trees (apple, oak, beech, hickory etc.) can be planted in some pastures to provide feed for geese, turkeys and deer which can then provide recreational value for hunters in nearby woods (which may or may not be on the farmers lands).