
Are Your Pastures Working or Loafing?

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We have come through the winter season when perennial grass pasture growth is limited or nil. Spring is looked upon as a time of abundant forage, often a time of great surpluses which can be harvested for hay or wasted. It is a good feeling when hay feeding has ended and cattle have ample grazing. It is a good time to think about managing pastures to derive the most benefit from them.

Growing forage in a pasture is somewhat like operating a factory. The "pasture factory" should be hard at work capturing sunlight and converting it into sugars to grow grass and clover leaves for consumption by cattle. The factory manager must see to it that working conditions are favorable and that the factory employees (grass and clover leaves) are working efficiently. If they are not working but loafing, productivity declines along with profitability. Thus, the factory manager must know what is going on and understand why employees are or are not working. Keeping employees on a factory-supported welfare program is fiscally irresponsible.

Individual plant leaves utilize light to produce sugars via the process of photosynthesis. Leaves of warm season grass leaves such as bermudagrass, pearl millet, and corn have the potential to utilize large amounts of sunlight when water, soil nutrients, and temperature are favorable. In contrast, leaves of cool season grasses such as tall fescue, wheat, and ryegrass can utilize only about one-half as much sunlight as the warm season grasses but can photosynthesize and grow at lower temperatures. On the basis of efficiency in utilizing sunlight, it would seem that the warm season grasses should be the most productive.

On the basis of individual leaf employees, the pasture factory should be working just fine if there is sufficient sunlight, water, nutrients, and temperature are favorable. But, there are several major problems.

Problems:

(1) As more leaves accumulate in the pasture they form a canopy and tend to shade one another. As shading increases with more leaves, there is insufficient sunlight for the individual leaf to photosynthesize and produce sugars at its potential. Thus, many of the leaves are loafing and not contributing to the factory productivity. Different grasses and legumes differ in their leaf orientation to cause shading of leaves in the lower part of the pasture canopy. Some plants such as clovers tend to have their leaves oriented in a horizontal fashion so that they shut out all the sunlight to the ground when only about 3 leaf layers are present. When more leaf layers of clover are present, the lower leaves receive little or no light and thus capture no sunlight for the factory. Grasses such as tall fescue have leaves at a more vertical angle and allow light to penetrate deeper into the canopy, allowing about 6 leaf layers per unit of ground area before self-shading becomes a problem. Bermudagrass allows somewhat more light penetration and pearl millet can have 10 to 12 leaf layers, allowing much greater light utilization.

It might seem from this that it would be desirable to maintain a pasture at a permanent leaf area to capture as much sunlight as possible. Unfortunately, this does not work in practice and good pasture grazing management requires a different approach. Shading in the pasture canopy not only reduces sugar production but reduces root growth, and with clovers reduces nitrogen fixation by the root nodules.

(2) Leaves, like people, become older and less efficient with time. Leaves of most pasture plants are operating at peak photosynthetic efficiency at about 10 to 20 days of age. Depending on plant species, temperature, and shading, leaves of most pasture plants cease any appreciable food production by photosynthesis after 25 to 45 days. Thus, these leaves have reached senility and are no longer

productive workers but are now on welfare. Obviously, the factory manager needs to take action to move these unproductive workers out and make room for youthful productive workers.

(3) With the accumulation of large amounts of leaf (and stem) material in a pasture with new leaves arising only from the top of the canopy, the intense shading at the bottom of the canopy is extended over a long period. With most grasses and clovers, new bud development ceases or is severely depressed. This means that when the old dead leaves and stems are removed by grazing or mowing, new growth will be slow. When tall fescue is cut for hay very late in spring at seed maturity, the limited number of buds results in less regrowth than would have occurred if the hay had been cut earlier. In the case of arrowleaf clover cut for hay in spring, few buds are present to initiate new growth as compared to a grazed pasture of this clover which can continue productive growth until June or July. Thus, sunlight is necessary to maintain a high population of buds to initiate new growth of grasses and legumes in a pasture.

(4) Accumulation of large quantities of old leaves and stems in a pasture also reduces overall nutritive quality. As plant material matures, the feeding value declines. Coastal bermudagrass at 4 weeks of age has a digestibility of around 62% but at 8 weeks it declines to only 47%. In a pasture the problem is accentuated by the cattle selectively grazing only the newest leaves, leaving the mature, unpalatable material which continues to get worse with time. Thus, it is new leaves that contribute to high nutritive quality that are eaten by cattle when they have a choice.

Solutions:

When a factory is overstaffed with unproductive employees, one can continue to subsidize the enterprise (as has been done in the state-owned factories

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and farms of the former USSR and eastern European countries) or more realistically downsize and restaff with productive employees. Unfortunately, some livestock producers have pastures with most of the leaves loafing (shaded by too much leaf area so they receive insufficient sunlight to work) or too old to work (overage leaves). The low leaf productivity, together with declining nutritive quality of those leaves, results in a pasture with seasonal growth problems and often less than desirable animal performance.

Most perennial pastures are closely grazed in winter which is fine. The problem comes in spring when pasture production exceeds that of the livestock requirements. Obviously, higher grazing pressure is needed to utilize the heavy growth and stimulate new leaf growth. Since more animals are not available, animals need to be concentrated on part of the pasture area and the extra area harvested for hay. This will call for more cross fencing but it will result in much better utilization of the available forage. Then, after hay is removed from surplus areas, cattle can be rotated back to graze leafy new growth. Ideally, heavy grazing pressure in spring will improve pasture productivity and quality of tall fescue. Less grazing pressure in summer to maintain several inches of leaf growth of tall fescue in summer will favor productivity and reduce weed encroachment. With warm season grasses, heavier grazing pressure is needed in summer to stimulate new leaf production and maintain higher quality. Nutritive quality of warm season perennial grasses such as bahiagrass and bermudagrass declines faster than cool season grasses with maturity.

Cross fencing of pastures to allow some method of rotational grazing and conservation of surplus forage as hay allows the pasture manager to reduce the problem of loafing or aged leaves. Since the function of a pasture is to capture sunlight and produce sugars for leaf production for cattle to eat, then management must be directed toward keeping young green leaves over as much of the season as possible. In one sense, the pasture manager is a "leaf manager" of the factory. One can't afford to keep loafing or unproductive leaves on the payroll!