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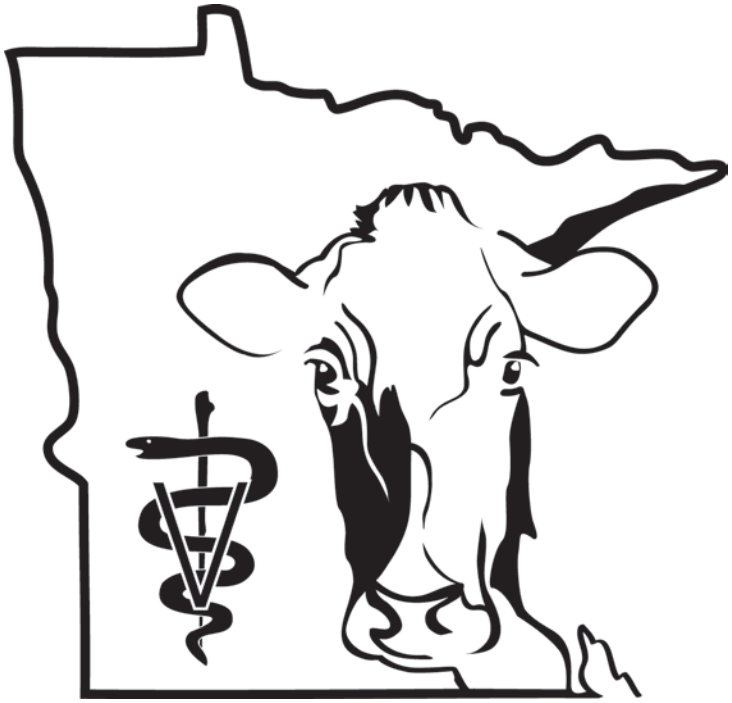

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INTENSIVE ROTATIONAL GRAZING

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Recently, there has been considerable interest in feeding dairy cows using rotationally grazed pastures. This interest represents a major change in dairy management which since the 1950's has focused on confinement feeding and extensive use of stored feeds. Rotational grazing has been touted as the natural way to produce milk and as a strategy to save money and labor and to have healthier cows.

'Intensive grazing', 'controlled grazing', and 'strip grazing' are terms which describe types of rotational grazing (Table 1). With all types of rotational grazing, the producer manages livestock use of pastures; the producer controls the duration of pasture utilization and which plants and plant parts livestock are consuming. In contrast, in continuous grazing systems, livestock decide what and when they eat. Intensive rotational grazing systems generally involve use of a large number of paddocks with a rest period between grazings (Figure 1). For dairy cattle, milking cows are usually exposed to new forage every 12 hours. This minimizes forage waste due to defecation and trampling and regularly provides fresh forage to the animals.

Properly developed rotationally grazing systems have the potential to allow for maximizing profit from pastures. We recently compared dairy cow performance in intensive rotational grazing and a confined feeding system at Grand Rapids, MN. We found that cows obtaining almost all their forage from pasture from May through October had lower milk production, but that net return per cow was greater for the pasture system. These greater net returns were due to lower labor, feed, bedding, and facilities costs. We did not observe any health differences between cows fed in confinement or on pasture.

Meeting Nutrient Needs of Livestock

Forages. Meeting nutrient needs starts by providing season-long availability of nutritious, palatable, non-toxic forage. Season-long grazing is best achieved using a pasture system approach which combines use of both permanent and cropland pastures. The predominant forage plants in many permanent pastures are perennial grasses such as Kentucky bluegrass, quackgrass, and smooth bromegrass. A typical pattern of pasture production from these and other grasses is shown in Figure 2. This uneven and declining forage production does not meet the nutritional needs of most livestock. One solution to this problem lies in diversification of the forages. Diversification provides the opportunity to achieve uniform yields of quality forage throughout the entire season. Perennial legumes, improved perennial grasses, and annual grasses and legumes should be considered. Forages with yield patterns which complement one another should be selected.

Pasture systems should be developed which include separate permanent pastures and cropland pastures. Permanent pastures usually are composed of perennial grasses and are often located on erodible or nontillable sites. These pastures are most productive in the spring and fall and should be the backbone of your pasture system. Permanent pastures should be supplemented with cropland pastures during summer and other periods when forage deficits exist. Options for cropland pastures may be perennial legumes such as alfalfa, or other annual crops such as brassicas and sudangrass. Some cropland pastures can be harvested for hay in the spring when not grazed. The availability of new lightweight, portable fencing systems facilitates rapid conversion of cropland to pasture land.

Forage legumes are especially valuable for pasture because they have high yield and excellent forage quality. Legumes can fix their own N and have greater drought tolerance than perennial grasses. Shortcomings of legumes include low tolerance to abusive grazing, wetness, and low fertility. In addition, some legumes like alfalfa, white clover, alsike clover, and red clover can cause bloat.

Grazing and rest periods: Following grazing, most grasses and legumes will begin regrowth within a week. Therefore, short grazing periods of 1 to 6 days will prevent animal grazing of the regrowth and will enhance persistence of desired forages. Grazing periods greater than a week and continuous grazing are especially detrimental to the persistence of palatable legumes because livestock actively seek and graze them.

Forage legumes like alfalfa, red clover, and birdsfoot trefoil will not usually persist without a 4-week rest period for replenishment of reserves. Therefore, in continuously grazed pastures perennial grasses are the predominant species after a few years of grazing. Cool season grasses like smooth bromegrass, timothy, and bluegrass need a short rest of as little as 2 weeks during cool weather and 5 to 7 weeks during hot weather; whereas, warm season grasses need 5 to 6 weeks during cool weather and about 3 weeks during hot weather (Undersander et al., 1991). Since crop development can be affected by temperature, drought, and fertility, it is more important that initiation of grazing be based on plant development. Legume grazing is usually initiated at pre-bud stage when 10 to 12 inches tall, tall growing grasses such as smooth brome, or orchardgrass at 7 to 12 inches, and bluegrass at 4 to 5 inches.

Height of grazing: Height of grazing influences the amount of leaf area present for regrowth and consequently the rate of regrowth. The higher the stubble, the more rapidly the plant will regrow following grazing. With a 4-week rest period, most legumes and tall growing grasses should be grazed to a 2 to 4 inch stubble height. Since the top of plants is leafiest and usually the highest quality, height of grazing can influence animal performance. For animals with high nutritional needs such as milking cows, energy intake can be increased by allowing animals to eat only the tops of plants. Forward creep feeding (Table 1) is an example of this type of grazing management.

Stocking rates and herbage allowance. Animal performance and production per acre are greatly influenced by herbage allowance. With high herbage allowance resulting from low stocking rates, performance of individual livestock increases but production per acre

decreases (Figure 3). At low stocking rates, high gain per head occurs because animals are able to select high quality forage, but yield per acre is low because of forage is wasted of forage. At higher stocking rates, competition among animals for forage increases, selectivity decreases, and gain per head decreases; however, gain per acre is usually greater. The stocking rate and herbage allowance to achieve the best balance between gain per head and per acre vary with producer goals; however, in intensive rotational grazing systems, usually less than 75% of the available forage is utilized.

Supplementing pasture forages. Diets of cows on pasture must be balanced to supply nutrient requirements. This involves sampling and testing of pastures to know the nutrient concentration and estimating forage consumption. It is generally believed that milk production from cows grazing quality pastures is limited by intake of digestible energy first and supply of bypass protein second (Combs, 1992). For cows consuming very high quality pasture which is low in fiber, some supplementation with hay often is necessary. Supplemental feeding of energy and bypass protein often has a major affect on milk production and on the cost of milk production. Therefore, the ultimate cost effectiveness of rotational grazing will be based on balancing the cost of feed supplements and the return per unit of milk produced.

Technology

The use of rotational grazing as an alternative feeding strategy has been greatly facilitated by the development of new fencing materials. Modern fencing systems consist of perimeter and subdivision fencing of hi-tensile wire, and lightweight portable fencing such for temporary subdivision. Modern fence energizers are more effective in repelling livestock and are reliable than older systems. A modern low impedance energizer delivers a stronger shock and the system is less subject to service interruption due to faulty insulators and contact with vegetation.

Summary

Intensive rotational grazing is an alternative feeding strategy for dairy cows. If forages and grazing animals are well managed, returns from intensive rotational grazing compare favorably to confinement-stored feeding systems.

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Table 1. Definitions of pasture utilization terms.

Continuous grazing:	A grazing system in which livestock graze for extended periods of time within the confines of one fence, usually associated with extensive management.
Rotational grazing:	A grazing system in which a number of subpastures or paddocks are grazed in sequence. Anywhere from 2 to 40+ paddocks may be used.
Controlled grazing:	A grazing management system in which forage availability, quality, and utilization are managed by the producer.
Intensive rotational grazing:	A rotational grazing system in which length of the grazing period is typically less than four days.
Ration grazing:	A controlled grazing system in which a predetermined amount of forage is allotted to the animal on a daily, weekly, etc. basis.
Time-limit grazing:	A practice by which a limited amount of usually high quality forage is allowed to the animal for a short period of time, usually once or twice daily as a supplement to lower quality forage.
Strip grazing:	A rationed grazing system in which a pasture, usually of accumulated growth, is grazed off in strips to enhance utilization rate. No further grazing is anticipated. If it were to be regrazed this would be a rotational system.
First & second grazing:	A rotational grazing system involving two classes of livestock with different nutritional requirements. The group with higher requirements grazes a paddock first to select prime feed and the lower nutritional group follows into the paddock after the first group has been moved to a fresh paddock.
Forward creep grazing:	A modified first/second grazing system utilizing cow-calf pairs with calves being first grazers but retaining access to the paddock where the second grazer cows are confined.

Source: Gerrish, 1990

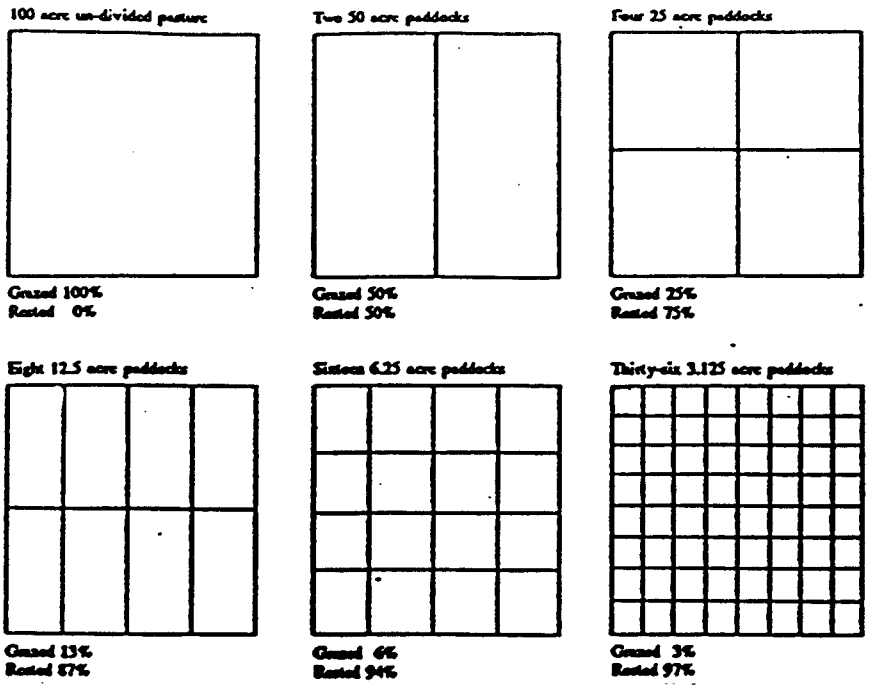

Figure 1. Pasture division for rotational and continuous grazing. Also shown are the relative grazing and resting periods for each system. Source: Undersander et al. 1991.

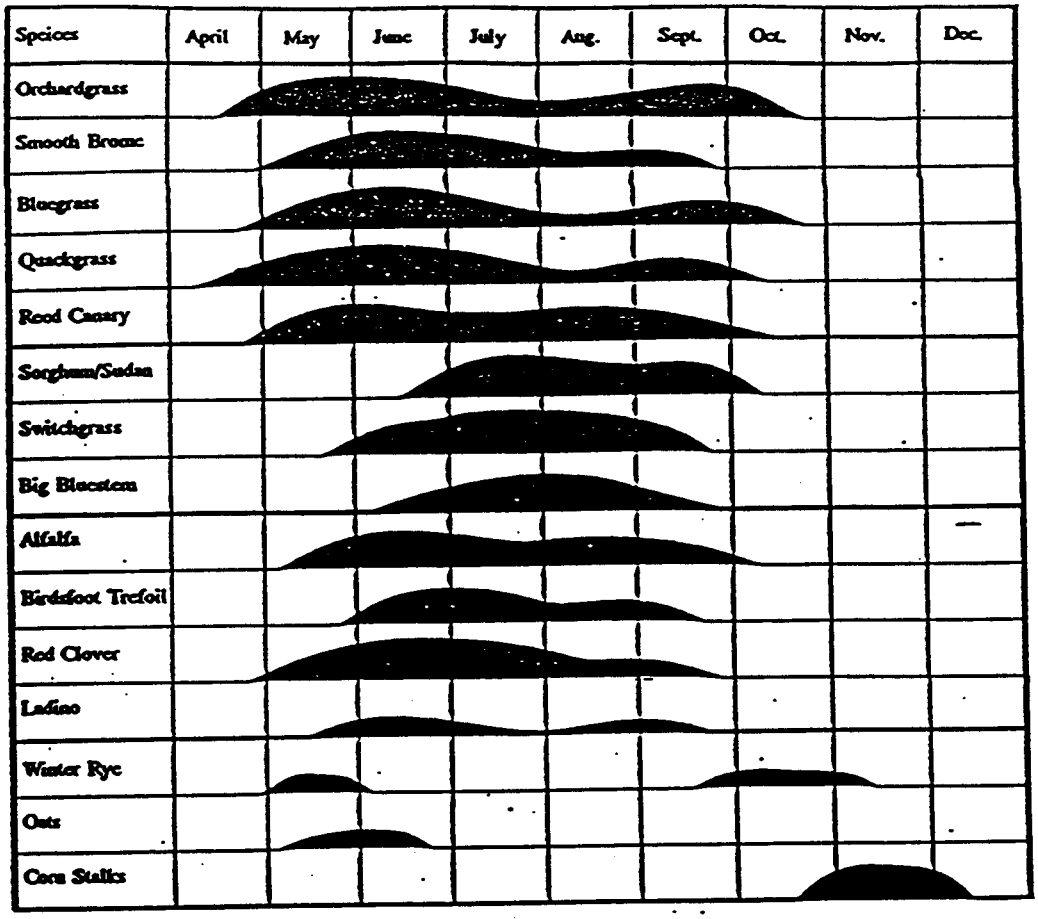

Figure 2. Relative forage yield patterns for forage grasses and legumes. Source: Undersander et al., 1991.

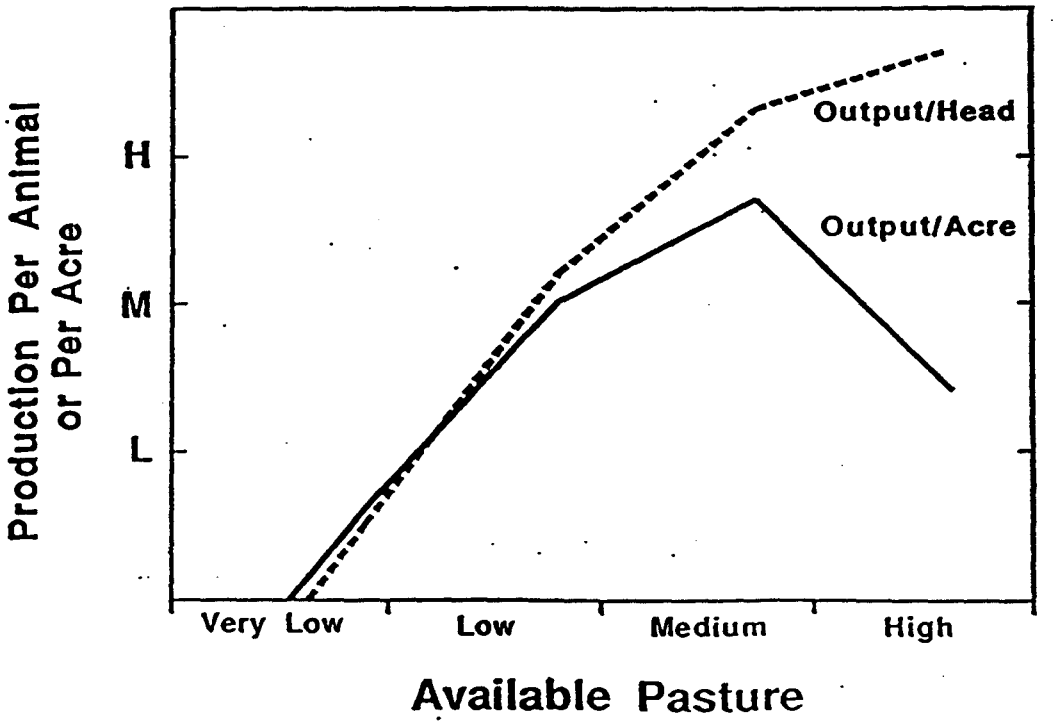

Figure 3. Output per head and per acre at three levels of available pasture.