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Alfalfa N Credits for Corn in 2009

With the high cost of nitrogen (N) fertilizer, it is critical that N credits are accounted for when corn follows alfalfa. Nitrogen credits from forage legumes typically last two years. Table 1 shows the amount by which N fertilization should be reduced when corn follows alfalfa. These guidelines assume a last alfalfa cutting by early September, leaving up to 6" regrowth before fall tillage. If regrowth is considerably > 6", first year alfalfa N credit should be increased by 40 lb/ac.

In no-till cropping systems where alfalfa regrowth is not incorporated into the soil, the alfalfa N credit will be considerably less than that shown in Table 1. For example, when no-till corn is planted following a good stand of alfalfa, the appropriate N credit is equivalent to that for a poor stand of alfalfa (≤1 plant/ft^2). In comparison, when no-till corn follows a poor stand of alfalfa, there should be no N credit, and the appropriate N fertilizer rate is equal to that for corn following corn. It is possible that no-till slows the rate at which soil microorganisms decompose alfalfa roots, thus causing N credits to be distributed over a longer period of time. Data are limited, however, for no-till corn following alfalfa in the northern Corn Belt.

To properly adjust N fertilizer rates for corn following alfalfa, it is important to know the N fertilizer guidelines for corn following corn (Table 2). These guidelines are consistent across Minnesota, and are based on the N cost/corn price ratio. If one assumes a N cost of $0.50/lb N and an expected corn price of $5.00/bushel, the N cost/corn price ratio would be 0.10. Assuming a ratio of 0.10, the N rate that maximizes profitability is 140 lb N/ac on average. However, if this corn followed alfalfa with ≥4 plants/ft^2, the alfalfa N credit would be 150 lb N/ac, so N fertilization would not be necessary.

To obtain the most up-to-date N fertilizer recommendations for specific N costs and corn prices, see the online N rate calculator (URL below).

A frustrating issue with N rate recommendations is that the optimum N rate varies from year to year, as indicated by the acceptable range for N fertilization in Table 2. Some producers try to pick N rates on the lower end of this range when dry growing seasons are predicted, and N rates on the higher end of this range in years when abundant growing season precipitation is expected. However, it is difficult to predict growing season precipitation well in advance, and annual use of the average rate for maximizing economic return to N fertilizer (MRTN) will likely maximize profitability over time.

Table 1. Nitrogen credits for corn following alfalfa with fall tillage in MN.

Alfalfa Stand	N Credit for Corn (lb N/ac)	
	1st Year	2nd Year
≥4 plants/ft^2	150	75
2-3 plants/ft^2	100	50
≤1 plant/ft^2	40	0

Table 2. N fertilization (lb N/ac) for corn following corn on highly productive MN soils. (Reduce N rate 20 lb/ac on medium-yield soils.)

N Cost per lb:Corn Price Ratio	MRTN (Max. economic return to N	Acceptable Range
0.05	155	130-180
0.10	140	120-165
0.15	130	110-150
0.20	120	100-140

Source: Randall et al. 2008. BMPs for N Use in South-Central MN.

Author: Jeff Coulter, Extension Corn Agronomist

N rate calculator: http://extension.agron.iastate.edu/soilfertility/nrate.aspx
N management for corn in MN: www.extension.umn.edu/topics.html?topic=4&subtopic=17
N credits for legumes: www.extension.umn.edu/distribution/cropsystems/DC3769.html

Inside this issue...

Upcoming Events

2009 MN Forage Days
February 9-13

Tentative Dates/Locations:

Feb. 9 Lamberton
Doug Holen
218-998-5787

Feb. 10 Grand Rapids
Russ Mathison
218-327-4352

Feb. 11 Detroit Lakes
Doug Holen
218-998-5787

Feb. 12 St. Cloud area
Dan Martens
800-964-4929

Feb. 13 Rochester
Lisa Behnken
888-241-4536

General info:
peter072@umn.edu
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Visit www.extension.umn.edu/forages for updates.

Forage Quality for Dairy Replacements

The cost of raising dairy heifer replacements can amount to 20-25% of the total costs of milk production for a dairy operation. The goals in raising heifers are to keep them healthy, have consistent growth to attain target goals for frame size and body weight at first calving without excessive body condition, and reduce feed costs. There are many different combinations of feeds that can be used in raising heifers with forage comprising the largest percentage of the diet.

At the U of MN Southern Research and Outreach Center in Waseca, a study involved 96 Holstein heifers (starting averages were 203 lb body wgt. and 37" hip height) from 3 to 6 months of age fed free-choice alfalfa hay.

Heifers gained 1.9 lb/d on a 100-RFV hay and 2.1 lb/d on both 131- and 154-RFV hays. So, feeding lower quality forage, limit feeding grain and providing sufficient protein and energy can result in acceptable growth rates for this age group.

Heifer diets can consist of low-cost, high-tonnage crops, such as corn stalks, sweet corn silage, mid-bloom alfalfa silage, or low-quality grass hay. If the forage energy and protein are slightly deficient, grain and protein supplement can be used to fortify heifer diets. Prices should be continuously monitored in order to supply nutrients at the lowest cost.

If heifers will not consume enough low-quality forages to meet their nutrient needs, blending the low-quality forage with higher quality forage may be necessary. In general, heifers like high-quality forages and will thus consume more and gain more weight. To prevent excessive weight gain from high-quality forages, one option is to limit feed it. Another option is to decrease the energy concentration of the grain mix, for example, by adding higher fiber ingredients such as by-product feeds.

When choosing forage quality, consider economics. Remember, however, that low-quality forages must be palatable. Forages fed should be free of spoilage and mold.

Author: Neil Broadwater, Dairy Extension Educator.

Manure: A 'Green' Approach to Forage Fertilization

Dairy cows excrete more manure than milk. As herd size and/or production increases, many dairy farms need to consider spreading manure over more acres. Should you apply manure on your perennial forage acres? Yes, but this question raises several others. These days, your decision has larger economic consequences and may impair herd health and the environment.

Is manure application before seeding perennial forages a good idea?

Often, the answer is "Yes." Manure provides needed macronutrients (N, P, K, sulfur, calcium, and magnesium) and micronutrients (e.g. boron and molybdenum). Apply manure according to recommendations based on P and K soil tests, mix well to avoid seed contact with manure, and coat legume seed with the proper rhizobial inoculum. On sandy or shallow soils, plant a fast-growing companion crop (e.g. oats, barley, or Italian ryegrass) to reduce nitrate leaching during establishment of the slower-growing perennials.

What about applying manure after forages are established?

The first question to ask is, "Could disease organisms be transmitted from manure to feed?" For example, if your herd carries Johnes disease, avoid applying manure on forages that will be grazed or harvested as hay. Many disease-causing microorganisms survive for a year on soil and plant surfaces, and are picked up during forage harvest. Proper ensiling often eliminates most pathogens, but a conservative approach is to avoid topdressing manure from diseased livestock.

Alternatively, shallow injection reduces pathogen transfer to the forage. Injection is becoming more feasible as new equipment enables low-rate manure application in shallow slots. This also reduces water pollution potential, complaints from neighbors, and nutrient losses. Injection improves manure value, and this may be the time to consider upgrading your equipment.

The second question is, "Can manure be applied soon after harvest and at a low enough rate to avoid stand damage?" The sooner manure can be applied, the better. Although broadcasting slurry is fast, slurry can coat plant leaves and may reduce photosynthesis. In a recent study, yield of the next alfalfa crop was reduced when >1.5 tons/ac of solids were broadcast (about 8,800 gal/acre with 4% solids). Soil condition also is critical – soil compaction from heavy axle loads on moist soil can decrease yield potential for the life of the crop.

Are there issues with applying manure before terminating perennial forage stands?

The most important issue here is the N credit. As explained in the article on page 1 of this newsletter ("Alfalfa N credits for Corn in 2009"), little or no additional N is needed for the corn crop if you incorporate alfalfa with more than 2 plants/ft^2. Adding manure to good stands reduces the value of both, and may lead to nitrate leaching losses. If you need the alfalfa acres to meet your manure management plan, consider harvesting the last regrowth and reducing tillage to minimize the alfalfa N credit and increase the need for additional N in the next corn crop.

Applying the right amount of manure, in the right way, and at the right time to perennial forages can enhance yields, provide good returns, and improve on-farm nutrient recycling.

Author: Michael Russelle, USDA-Agricultural Research Service, St. Paul.

Fall Overgrazing is Costly

In parts of northwest Minnesota, we have experienced three summers of very short rainfall during the pasture season. As a result, many livestock producers are heading into this winter with concerns about forage supply. If you are short of forage due to lack of moisture, the temptation to leave your livestock on pasture to get every last bit of pasture forage is a real possibility, but is this possibility also a problem?

What happens to plants that are overgrazed? Grazed pasture plants start to regrow in 3-5 days. Livestock prefer the tender new shoots of plant regrowth vs. the mature growth of plants going to seed. When you overgraze pasture, you allow livestock to continue eating the new regrowth, causing the plants to use up energy stored in the roots. Plants need leaf area to enable photosynthesis to produce stored energy for regrowth. Overgrazed plants do not have adequate leaf area for photosynthesis to take place.

What will pasture overgrazing in fall cost you next spring as plants start to grow? Overgrazed pastures have not had a chance to mature enough to store the energy reserves needed to power regrowth next spring. Overgrazed pastures are slow to grow in the spring. Livestock should be kept out of previously overgrazed pastures to allow them to recover. Overgrazing in the fall costs you pasture growth and tonnage the following year.

How about weeds in overgrazed pastures? Overgrazing causes the desirable pasture plants to be weak. Weak pastures cannot compete with weeds. Overgrazing is the #1 cause of weeds moving into and taking over pastures. Rotational grazing management, where pastures are given rest periods and allowed to regrow and put down root reserves, is the best pasture weed control management strategy. This allows the desired plants to thrive and compete with weeds.

Are there management practices that help an overgrazed pasture the following season? All plants need proper nutrition to thrive and grow. Take soil samples of your pasture and fertilize accordingly. Allow the pasture plants to grow to the proper height to allow photosynthesis to create the energy needs of the plant both for growth and root reserves before beginning to use the pasture the following spring. Remember that what you have on top of the soil for plant height is about the same as you have below the soil for a root system. Overgrazed short plants do not have much of a root system; the taller the plants, the more extensive the root system is to take in needed nutrients and moisture.

Overgrazing causes long-term problems and setbacks. Think twice about the costs of grazing pastures too close in fall. Consider rotational grazing as a management practice to keep your pasture producing more tonnage and being able to compete with weeds. Consult Extension for more resources on rotational grazing, pasture plant species, pasture fertilization, and plant growth.

Author: Vince Crary, Otter Tail Co. Extension Educator

Rust Found on Alfalfa in West-Central MN

An underperforming alfalfa field in west-central MN was brought to our attention by a producer and seed company in October 2008. The 40-acre field displayed alarming browning of foliage visible from a distance. Growth had ceased at about 12", and the foliage was completely killed. Regrowth from the crown had begun in September, resulting in 3-4" of new growth that was in good health. The field hadn't been harvested since July. The site was planted in fall 2007 with good fertility and pest management programs, and a good stand was established. Plants were collected and brought to Extension pathologist Dr. Charla Hollingsworth, who confirmed the casual organism to be rust. Soon after, we identified the same disease in one of our alfalfa variety evaluations in Otter Tail Co.

This is the first time we have been in fields with alfalfa rust, so its discovery warranted some background reading. While it isn't mentioned in most of our alfalfa production manuals, it is described extensively in the Compendium of Alfalfa Diseases. Alfalfa rust is present worldwide but not common in our climate. The organism can cause severe defoliation from mid- to late season in fields with harvest intervals > 30 days. It can also decrease winter hardiness and contribute to winterkill on newly established fields in northern states.

Alfalfa rust is easily identified by small reddish/brown pustules that first develop on leaf surfaces and then spread to the stems. The result is premature leaf death, leaf drop and increased susceptibility to fall frosts. Leafy spurge has been found to be an alternate host. The good news with this disease is the life cycle. Similar to leaf rust in small grains, the organism does not overwinter in MN. The rust pathogen was brought to our area by spores blown in on southern winds, flushed from the air by rain events, and landing on regional alfalfa fields. Though spores may blow in every year, seldom do we get detectable infection. This year's disease may be due to heavier-than-normal spore dispersal, stands weakened by summer drought, favorable humidity and temperature in September, and stretched harvest windows due to a dry, cool growing season.

This update is primarily intended to make others aware of a forage disease not often seen. Had the producer identified this disease early, a fungicide application may have been beneficial. There are currently only two commercial varieties with resistance, but a more practical approach to controlling rust is timely harvesting to reduce leaf loss and remove inoculum.

Authors: Doug Holen, Crops Extension Educator; and Dean Malvick, Extension Plant Pathologist

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Turnips for Grazing

Turnips are grazed in many parts of the world, but are not commonly grazed in the Midwest. They are a member of the brassica family, which also includes rape, kale and swedes. Brassicas are cold-, drought-, and heat- tolerant, with excellent forage quality. They are annual forbs, herbaceous plants that are neither legume nor grass.

Turnips are being studied at the UMN's North Central Research and Outreach Center in Grand Rapids to provide additional grazing and to extend the grazing season. In 2007, turnips were planted in small plots at 4 lb/ac in early June with a Brillion seeder. Despite heat and drought, the turnips germinated and grew rapidly. At a mid-October harvest, aboveground forage of turnips yielded 3,547 lb DM/ac, with 18% CP, 69% TDN, and a RFV of 207. Turnip bulbs were 2,943 lb DM/ac, 18% CP, and 72% TDN.

In 2008, we observed cattle response to grazing turnips, and turnip response to grazing. Turnips were seeded into two pastures previously used as winter feeding areas often under-utilized for grazing. Turnips were planted in June at 3 lb/ac during good growing conditions. Turnip germination and early growth was very rapid as was weed germination and growth in the heavily manured area.

One of the pastures was grazed early in the summer when most of the turnips were about 8" tall. When cattle turnip bulbs while grazing the leaves, there was no regrowth. Cattle did consume turnip leaves, but they were not the cattle's first choice. First, cattle grazed a grassy corner of the pasture, then ate much of the weed forage, and the turnips last. Grazing did not uproot many turnip bulbs, and new leaves sprouted from the small bulbs within a few days.

The second turnip pasture (3.6 acres) was rotationally grazed by pregnant beef cows beginning August 18. Most of the turnips were about 24" tall, and the turnip bulbs were baseball to softball size. Initially, cattle did not consume the bulbs; they consumed only the green forage above ground. The uprooted bulbs were left untouched lying on top of the ground. After a few days, however, cattle returned to previously grazed areas and consumed the turnip bulbs. There were less than 10 bulbs left, with manure on them, in the entire 3.6-acre pasture. The table below contains forage yield and quality data collected from the 3.6-acre turnip pasture. Forage from this pature supported 39 pregnant beef cows for 10 days.

	Lb DM/ac	%CP	%TDN	RFV
Turnip Leaves	1700	12.8	64.3	198
Turnip Bulbs	990	8.0	63.0	—
Weeds	3070	8.7	56.3	89
Total	5760	—	—	—

There are potential concerns with cattle grazing turnips, but rarely do these problems occur. Turnip leaves can cause hemolytic anemia (a blood disease), pulmonary emphysema (a breathing disorder), polioencephalomalacia (a brain disorder characterized by twitching and incoordination), and even bloat. These problems generally occur during the first two weeks of grazing; however, these problems are rare and are reduced or eliminated with management. General management considerations include adjusting cattle to turnip pastures by feeding high quality hay or grazing pastures a couple of weeks before being turned out on turnips.

Preliminary research with turnips answered several basic management questions. Turnips can be established successfully in sub-optimum seedbeds, cattle will consume turnip leaves and bulbs after adaptation, and multiple grazing can be achieved if grazing occurs when the plants are short and not fully developed. Future research will focus on seeding rates and seeding method. Increasing the seeding rate may result in fewer weeds. Incorporating turnips into a pasture mix, wheat or oat stubble, or into winter feeding areas may provide an opportunity to increase pasture productivity when cool-season grasses slow down in production in mid summer.

Authors: Russ Mathsion, NCROC Agronomist, Grand Rapids; and Ryon Walker, Beef Extension Educator