



University of Minnesota Extension Forage Program

# Forage Quarterly

To improve and promote the economic and environmental value of growing forages in Minnesota

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UNIVERSITY OF MINNESOTA  
**EXTENSION**

## 2010 MN Forage Days Feb. 8-12

*Inside this issue...*

**EQUIPPED FOR SUCCESS** is the theme for the 2010 Minnesota Forage Days offered at 5 locations February 8-12. The program is co-sponsored by University of Minnesota (UMN) Extension and the Midwest Forage Association (MFA).

**Dr. Dan Undersander**, University of Wisconsin Extension Agronomist and Professor, is the featured speaker. Dr. Undersander, an internationally-renowned St. Cloud native and UMN graduate, will discuss equipment strategies to speed hay and haylage curing in the field. Undersander will also address seeding dates for perennial legume and grass forages, and methods to reduce ash contamination in stored forage.

The **Detroit Lakes Forage Day** (Feb. 8) will also feature UMN Extension Educator Dr. Phil Glogoza addressing alfalfa insect pest management emphasizing alfalfa weevil. UMN Forage Agronomist Dr. Paul Peterson will provide an update on a 3-location, on-farm alfalfa/grass mixture trial. UMN Extension Educator Doug Holen will provide an update on other regional trials.

The **Cromwell Forage Day** (Feb. 9) will also feature a presentation on coping with molds and mycotoxins in livestock feed by Famo Feeds' Rob Riewer, DVM. John Deere's Jim Buchs will discuss practices for better hay. A producer panel will discuss high-intensity mob grazing.

The **Avon Forage Day** (Feb. 10) will include Dr. Glogoza's discussion of alfalfa insect management. UMN Extension Educator Dan Martens will provide an update on central MN forage projects. Nelson Dairy Consulting's Don Johnson will co-present corn-silage plot results. USDA-ARS scientist Dr. Hans Jung will discuss a recent dairy-cow feeding trial assessing the abilities of high-quality alfalfa and orchardgrass hays to substitute for grain in rations. Dr. Undersander will highlight the merits of short vs. long alfalfa rotations, and how the Relative Forage Quality (RFQ) index is working compared to RFV.

The **Lamberton Forage Day** (Feb. 11) will feature a presentation on forage economics and benchmarking by UMN Extension Ag. Business Management Educator Ron Holcomb. Dr. Undersander will discuss forage fertilization recommendations. UMN Equine Extension Specialist Dr. Krishona Martinson will discuss hay storage and feed-out management. UMN-Extension's Doug Holen will address alfalfa-grass mixtures for haying and grazing.

The **Rochester Forage Day** (Feb. 12) will include a regional Extension research trial update by UMN Extension Crops Educator Lisa Behnken. UMN Extension Dairy Nutrition specialist Dr. Noah Litherland will discuss the effects of the late and wet 2009 harvest on dairy nutrition. UMN-SWROC Extension IPM Specialist Bruce Potter will address alfalfa weevil and other troublesome pests.

A MFA representative will be at all 5 meetings to provide an update on MFA's continued success for our industry.

The UMN Extension Forage Team and MFA are grateful to sponsors DHIA Laboratories, Barenbrug USA, Syngenta Alfalfa, Croplan Genetics, Cargill, Dairyland Seed, Kemin AgriFoods North America, and Monsanto; and to UMN Extension administration for their generous support of the 2010 MN Forage Days.

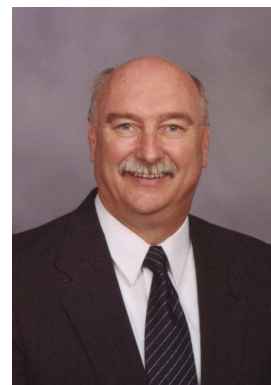
On-site check-in/registration for all meetings opens at 9:30 AM, with presentations from 10:00 AM to 3:00 PM. Registration includes attendance, lunch, refreshments, proceedings, and several other publications/handouts.

**Preregister by February 3** to receive a discount. For the Feb. 8 and 10-12 meetings, 2010 MFA members can preregister for only \$15, or \$20 on-site.

Detailed brochures and registration are on-line at [www.midwestforage.org](http://www.midwestforage.org); or call the MFA office at 651-484-3888.

2010 MN Forage Days Feb. 8-12	1
What's New in Harvest Equipment?	2
Alfalfa/Grass Mixture Research	2
Alfalfa N Credits to Corn Research	3
Annual Forages on Winter-Feed Areas	4
Your UMN Extension Forage Team	4

### 2010 MN Forage Days



**Dr. Dan Undersander**

Feb. 8 Detroit Lakes  
Holiday Inn  
[holen009@umn.edu](mailto:holen009@umn.edu)  
218-998-5787

Feb. 9 Cromwell Pavilion  
[salze003@umn.edu](mailto:salze003@umn.edu)  
888-241-4536

Feb. 10 Avon, Joseph's  
Restaurant  
[marte011@umn.edu](mailto:marte011@umn.edu)  
320-968-5077

Feb. 11 Lamberton UMN-  
SWROC  
[holen009@umn.edu](mailto:holen009@umn.edu)  
218-998-5787

Feb. 12 Rochester UCR-  
Heintz Center  
[lbehnken@umn.edu](mailto:lbehnken@umn.edu)  
888-241-4536

# What's New in Forage Harvesting Equipment?

The following article includes excerpts from a 2010 MN Forage Days Proceedings article by Dr. Dan Undersander, Univ. of Wisconsin. Attend a MN Forage Day near you Feb. 8-12 to learn much more.

The FORAGE EQUIPMENT industry is changing in response to farmers' needs. These changes include innovations to increase capacity, improve usability, and improve the quality of the product. Most changes are with existing equipment, but some totally new product innovations are occurring.

Machinery size has increased to enable more-efficient harvesting. Some of this equipment is used on larger operations, and some for contract forage harvesting, which has expanded rapidly across the U.S. in the last 15 years.

Self-propelled disc mowers have increased to almost 32 feet (in three banks), the largest rakes and mergers are 30 feet or wider, and the largest forage harvester has a 1020 Hp V-12 engine and can harvest up to 400 t/hour.

Some design improvements in mowers include differing knife types for different needs and changes with weight load distribution. Most growers are switching from sickle to disc mowers due to their reduced maintenance requirement. Data are clear that disc mowers do not reduce alfalfa yield or stand life more than sickle bar mowers.

Differing knives are available for disc mowers, and the choice among them should be made with some deliberation. The most common are knives that are angled at ~14° to enhance picking up downed forage. Mowers with these knives really do pick up downed forage better than those with flat knives. However, angled knives pick up soil more when the ground is dry. Angled knives can add 1 to 2% ash to the harvested forage. So the grower must decide which is more important; picking up downed forage or having less ash in the forage.

Cutting height should be adjusted according to management goals. Lower cutting height results in higher alfalfa yield of alfalfa as long as crowns are not cut, but should be ~3.5 inches if grass is included to

allow rapid regrowth. Higher cutting height will also reduce ash content.

Mowing and conditioning equipment should be bought with forage-drying essentials in mind:

- 1) beginning with a wide swath (greater than 70% of cut area) to maximize leaf drying and stop respiration.
- 2) keeping swath off the ground to enhance drying and reduce soil contamination.
- 3) conditioning/macerating to increase stem drying rate for hay; note that greater conditioning/macerating will increase drying rate but at greater cost in terms of initial capital investment and fuel use.

Raking should occur with tines not touching the ground. Windrows should be merged to the biggest that harvesting equipment can handle. Using a merger will reduce alfalfa leaf loss and ash contamination.

Bale cutters will improve the quality of the final product in terms of reduced feeding losses and improved animal performance.

## On-Farm Alfalfa/Grass Mixture Evaluation

ALFALFA/GRASS mixture trials were seeded near Hutchinson on 25 August 2008 and near Underwood on 29 August 2008. Treatments included binary mixtures of alfalfa with different perennial grasses, and alfalfa seeded alone at 2 different seeding rates. Three alfalfa varieties were tested: Rebound 5.0, 4S419, and Spredor 4. Alfalfa seeding rates in mixtures averaged 13 lb PLS/acre.

Two varieties of each of 9 grass species were used. Grass species (and seeding rates) included smooth brome grass (10 lb/ac), meadow brome grass (10 lb/ac), timothy (4 lb/ac), reed canarygrass (6 lb/ac), orchardgrass (6 lb/ac), perennial ryegrass (8 lb/ac), festulolium (8 lb/ac), tall fescue (8 lb/ac) and meadow fescue (8 lb/ac).

In 2009, 4 harvests were obtained at Underwood: June 11, July 10, Au-

gust 26, and October 19. The Hutchinson site was harvested 3 times: May 29, July 1, and August 27. Plots were flail harvested to a ~4" residual.

Four harvests produced an average total of 2.40 ton DM/ac at Underwood, whereas three harvests at Hutchinson resulted in a 2.72 ton DM/ac average. There was greater grass presence at Underwood (avg. 28%) than Hutchinson (avg. 7%).

At Underwood; 13, 34, 26, and 27% of total-season yield was harvested with the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> (October) cuttings, respectively. At Hutchinson; 42, 36, and 22% of total-season yield was harvested with the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> cuttings, respectively.

At Underwood, mixtures of alfalfa with meadow brome grass, reed canarygrass, perennial ryegrass, tall fescue, or orchardgrass produced similar

total-season yield to alfalfa alone; among these mixtures, orchardgrass and meadow brome grass had the greatest presence, averaging ~30%. Alfalfa/timothy mixtures had the lowest yields and greatest grass presence throughout the season. Alfalfa/perennial ryegrass mixtures were among the top yielders at every harvest and averaged 20% grass.

At Hutchinson, there were no yield differences among mixtures at individual harvests or over the whole season. However, alfalfa mixed with orchardgrass, perennial ryegrass, or festulolium had the greatest grass presence, though only ~10%.

Authors: Paul Peterson, Doug Holen, Dan Martens, Dave Nicolai, Jim Paulson, Betsy Wieland, Nathan Winter, and Russ Mathison; UMN Extension.

# On-Farm Validation of Alfalfa N Credits to Corn

ROTATING alfalfa with corn is useful to 1) reduce soil erosion, 2) enhance soil tilth and carbon storage, 3) reduce weed seedbanks, 4) disrupt the life cycles of disease and insect pests of corn, and 5) supply nitrogen (N) to the subsequent corn crop.

University of Minnesota N-credit guidelines for corn following alfalfa are currently based on alfalfa stand density; and are 150 lb N/acre for  $\geq 4$  alfalfa plants/sq ft, 100 lb N/acre for 2 to 3 plants/sq ft, and 40 lb N/acre for  $\leq 1$  plant/sq ft. Respective second-year alfalfa N credits are 75, 50, and 0 lb N/acre.

To adjust N fertilizer rates for corn following alfalfa, subtract the appropriate alfalfa N credit from the N fertilizer rate you would apply to corn following corn. The cost savings are huge for farmers that accept these alfalfa N credits and reduce fertilizer input accordingly.

Minnesota-specific N-fertilizer guidelines for corn following corn and other crops are available at: [www.extension.umn.edu/Corn/nitrogen.html](http://www.extension.umn.edu/Corn/nitrogen.html).

**Table 1. First-year CORN-silage and grain yields following alfalfa as affected by final-alfalfa-year spring potash rates.** Data are averages over 5 MN locations in 2009, and 5 N-fertilizer rates applied to corn. (NS = yields were not statistically different among K fertilizer rates.)

Alfalfa K Rate	Corn Silage Yield	Corn Grain Yield
<i>lb K20/ac</i>	<i>t DM/ac</i>	<i>Bu/ac, 15.5%</i>
0	9.83	228
20	9.78	228
50	9.78	227
100	9.80	229
200	9.81	229
LSD(0.10)	NS	NS

With the high cost of N fertilizers, improved corn genetics, higher yields,

and tight economic returns; validation of the University's alfalfa N-credit guidelines is important to ensure grower success.

In spring 2008, with funding from the Minnesota Agriculture Fertilizer Research and Education Committee, on-farm experiments were established in third- or fourth-year alfalfa fields at five locations from southeast to central Minnesota.

All sites had medium soil test potassium (K) levels. Soils included loams, silt loams, and an irrigated sandy loam. Alfalfa stand density ranged from 4 to 9 plants/sq ft.

The objectives were to determine 1) whether alfalfa's yield and quality respond to top-dressed K applied in the spring of its final production year, and 2) the N-fertilizer requirement of corn following alfalfa that received different rates of K fertilizer during its last year of production.

In these experiments, soil fertility was maintained according to UMN recommendations for all nutrients except N and K. At each farm, replicated rates of 0, 20, 50, 100, and 200 lb potash/acre were applied to final-year alfalfa in early spring or after the first harvest.

Alfalfa was harvested three or four times after potash application. Total alfalfa hay yield and average relative forage quality (RFQ) did not differ with the rate of potash application. These alfalfa fields were terminated with tillage in the fall or spring depending on grower preference, and planted to corn in 2009.

After corn planting, five N fertilizer rates (0, 20, 40, 80, and 160 lb N/acre) were broadcast as ammonium nitrate within each of the larger plots that received the different rates of K fertilizer the previous year of alfalfa.

At all locations, corn silage and grain yields were high and unaffected by the rate of potash applied to alfalfa (Table 1) or the rate of N fertilizer applied to corn (Table 2). The lack of corn response to N fertilizer was consistent across all five potash rates applied to the previous alfalfa crop at all locations.

These results demonstrate the ability of reasonable alfalfa stands to supply adequate N to first-year corn over a range of soil and climatic conditions. In 2010, research will be conducted at an additional five locations to improve our confidence in these results.

**Table 2. First-year CORN-silage and grain yields following alfalfa as affected by N fertilizer rate applied to corn.** Data are averages over 5 MN locations in 2009, and 5 potash rates applied to final-year alfalfa. (NS = yields were not statistically different among N fertilizer rates.)

Corn N Rate	Corn Silage Yield	Corn Grain Yield
<i>lb N/ac</i>	<i>t DM/ac</i>	<i>Bu/ac, 15.5%</i>
0	9.77	228
20	9.75	226
40	9.81	228
80	9.78	229
160	9.88	229
LSD(0.10)	NS	NS

*Authors: Jeff Coulter, Extension Corn Agronomist, [coul077@umn.edu](mailto:coul077@umn.edu); Michael Russelle, USDA-ARS Soil Scientist; Craig Sheaffer, Professor of Forage Mgt.; and Dan Kaiser, Extension Nutrient Management Specialist.*

## **2010 Regional Horse Program**

Saturday, March 27

1:00 to 4:30 PM

Cloquet Forestry Center

Cloquet, MN

Topics: 'Daddy I Want a Horse Please!', optimizing your hay supply, vaccinations and deworming, preventing and treating colic, horse feeding top 10, hoof care, horse behavior, equine legal issues.

Register on-line by March 25 at:

[www.regonline.com/CloquetHorse](http://www.regonline.com/CloquetHorse)

More info at:

[www.extension.umn.edu/horse](http://www.extension.umn.edu/horse)

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Neil Broadwater  
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## Annual Forages on Winter-Feeding Areas

BEEF CATTLE are typically fed in somewhat confined areas during winter, creating excessive manure buildup and potential run-off. The manure is often hauled off and used as fertilizer. However, this practice is not cost-effective, and the manure is often managed improperly and thus underutilized.

By establishing annual forages on winter-feeding areas, a producer could reduce manure hauling and utilize the manure nutrients for the forages planted. Vigorous annual forages may be able to compete with weeds in these areas, and provide grazing to alleviate grazing pressure on other pastures.

Our objective was to evaluate annual forages and forage establishment methods in winter-feeding areas for growing-season grazing. Our goal was to evaluate the effectiveness and efficiency of these forage establishment systems.

We compared 3 spring seeding methods with 2 annual grasses in pastures where winter-feeding occurred the previous winter. The 3 establishment methods were conventional seeding with heavy tillage, no-till inter-seeding, and broadcast seeding followed by light tillage. Annual forages were cool-season annual ryegrass ('Maximum') and warm-season BMR sorghum-sudangrass ('Hot Hemi'). Locations included 2 north-central MN farms and the UMN NCROC.

At each location, soil samples were collected and pastures were divided and randomly assigned a seeding method-annual forage combination treatment. Annual forages were seeded at 25 lb/acre. Stand establishment, forage yield, stocking rate, and standing forage value data were collected at each location. Pregnant beef cow and/or beef cow/calf pairs were used to graze each treatment paddock.

Concentrations of phosphorus (P) and potassium (K) either met or exceeded maximum recommended levels (P=21ppm and K=160ppm). Organic matter ranged from 3.7% to 9.4%, and pH ranged from 5.4% to 7.9 % at the 3 sites.

Stand establishment of annual ryegrass and sorghum-sudan was successful with conventional and inter-seeding treatments at all locations, except one where conventionally-seeded ryegrass had only 15% stand. Establishment success was

limited for both forages with broadcast seeding, with only one site having 65% ryegrass stand establishment.

Forage yield of sorghum-sudan was greatest with conventional seeding, while annual ryegrass yield was greatest when inter-seeded. Based on our results, sorghum-sudan and annual ryegrass establishment was successful with conventional and inter-seeding methods, depending on location.

Managing winter feeding areas by rotating feeding sites frequently will expose more soil, enabling more success for newly seeded forages. Based on 2009 results, no-till inter-seeding provided the greatest opportunity for successful stand establishment and forage yield at low cost.

Soil type and latitude should be considered when choosing which species to seed and the seeding method to use. Conventional tillage on coarse-textured soils in late spring appears to negatively affect soil moisture and seedling establishment. Sorghum-sudan appeared to be at a competitive disadvantage with weeds when seeded in late spring at the 2 most northern locations.

Weed competition is likely in winter-feeding areas where perennial sod is highly disturbed. However, weeds grazed at early stages of development are readily grazed by beef cattle.

*Authors: Ryon Walker, Scott Bird, Russ Mathison, Troy Salzer, and Paul Peterson.*

### **2010 MN Beef Cow/Calf Days**

TOPICS: Beef Team updates, grazing systems, the basics and cost of developing heifers, economics behind the cow, keeping the younger generation in the beef business.

**Feb. 2 Staples 9:30, Bagley 5:30**

**Feb. 3 Lancaster 5:30**

**Feb. 4 Baudette 5:30**

**Feb. 5 Grand Rapids 5:30**

**Feb. 8 Mora 5:30**

**Feb. 9 Glenwood 9:30**

**Feb. 10 Pipestone 9:30**

**Feb. 11 Rochester 5:30**

**Feb. 12 New Prague 9:30**

*More details at:*

218-327-4490, [www.extension.umn.edu/beef/](http://www.extension.umn.edu/beef/)