University of Minnesota Extension Forage Program

Forage Quarterly

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

Volume 3: Issue 1

February 2009

2009 Minnesota FORAGE Days Feb. 9-13

Harvesting results for a profitable future is the theme for the 2009 MN Forage Days at five MN locations the week of February 9. The program is sponsored by UMN Extension and the Midwest Forage Association (MFA).

Dr. Jerry Cherney, Extension Forage Agronomist and E.V. Baker Professor of Agriculture at Cornell Univ., is the featured speaker at the Feb. 10-13 meetings. A UMN graduate, Dr. Cherney will share his extensive research and experience growing and feeding grass and alfalfa-grass silage to dairy cows. Cherney's research has shown that grass silage can produce as much milk per cow as alfalfa silage when rations are balanced.

UMN Extension Soil Scientist Dr. Dan Kaiser will address economic fertilization strategies for perennial forages at Floodwood, Detroit Lakes, and Rochester. UMN Extension's Corn Agronomist Dr. Jeff Coulter will present agronomy guidelines for optimizing corn silage production at Royalton and Rochester.

The Lamberton Forage Day is an afternoon-only program with an alfalfa focus. Extension Educator Doug Holen, SWROC Extension IPM Specialist Bruce Potter, and Extension Forage Specialist Dr. Paul Peterson will discuss recognizing and addressing insect problems, weed and disease management, forage establishment methods and management, and harvest management strategies.

The Floodwood program includes a research update on windrow grazing and turnips presented by NCROC Agronomist Russ Mathison. In addition, a MNDOT representative will present guidelines on transporting agricultural products.

The Detroit Lakes meeting includes regional forage research updates by Extension Educators Doug Holen and Vince Crary. Extension Educator Dr. Phil Glogoza will discuss forage pest identification and management, and Paul Peterson will address getting the most from establishment-year forages.

The Royalton meeting includes a presentation on forage options for the dairy herd by UMN Dairy Extension Specialist Dr. Noah Litherland. Sartell, MN producer John Traut will join Drs. Litherland and Coulter to discuss on-farm corn-silage testing. Extension Educator Dan Martens will share 2008 scissors-cut program experiences and provide a hay market update. USDA-ARS Soil Scientist Dr. Michael Russelle will discuss saving potassium dollars for last-year alfalfa and nitrogen credit to corn.

At Rochester, Dr. Cherney will also share information on the potential of grasses for bio-heat on farms. Regional research trial updates will be presented by Extension Educators Lisa Behnken and Neil Broadwater. UMN Extension Equine Specialist Dr. Krishona Martinson will discuss horse hay trends and marketing.

The MFA's Local Council Director Jenna Knoblauch will provide an update on MFA's most successful year yet. UMN Extension and MFA are grateful to sponsors NCR-SARE, DHIA Laboratories, BASF, Cargill, Croplan Genetics, Dairyland Seed, Kemin AgriFoods North America, Monsanta, NK Brand Alfalfa, and Pioneer Hi-Bred International for their generous support of the 2009 MN Forage Days.

The Lamberton program is from 12:30 to 4:15; all others run from 9:30 to ~3:00. Discounted pre-registration (except Floodwood) by Feb. 4 is encouraged. At Lamberton, MFA members pay $10 in advance, $15 on site. Non-MFA members pay $20 in advance, $25 on-site. Registration for Floodwood is $15 for all. For the Feb. 11-13 meetings, registration for MFA members is $15 in advance, $20 on-site. Non-MFA members pay $25 in advance, $30 on-site. Meeting brochures and registration forms are at www.extension.umn.edu/forages and www.midwestforage.org. **Register via MFA at www.midwestforage.org/processregselect.php, 651-484-3888, or midwestforage@comcast.net.**

UNIVERSITY OF MINNESOTA EXTENSION

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2009 MN Forage Days

Feb. 9 Lamberton SWROC
David Shelgren
507-236-2227

Feb. 10 Floodwood Savannah Portage
Russ Mathison
218-327-4352

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

Feb. 12 Royalton American Legion
Dan Martens
800-964-4929

Feb. 13 Rochester Heintz Center
Lisa Behnken
888-241-4536

Register via MFA:
www.midwestforage.org/processregselect.php
651-484-3888
Brochures/registration forms:
www.extension.umn.edu/forages
www.midwestforage.org

Grasses for Winter Wastewater Application Sites

A potato processing facility in northern Minnesota practices year-round wastewater application to cropland. Wastewater applied during winter creates an ice sheet several feet thick that is detrimental to plant persistence. At that facility, 'Palaton' reed canarygrass, 'Orion' orchardgrass, 'Baylor' smooth bromegrass, 'Climax' timothy, and a native quackgrass were compared. The year after seeding, forage yield and N uptake were similar for all grasses except quackgrass which had 25% less yield and less N uptake. Reed canarygrass had the greatest P uptake while quackgrass had the least. N and P uptakes were strongly influenced by forage yield as forage N and P concentrations (avg. 1.8 and 0.4%, respectively) were similar for all grasses. Low forage N concentration was due to N leaching.

Limited early season snow cover combined with 12" of wastewater resulted in an ice sheet from December to March. This resulted in significant stand loss for all grasses except quackgrass. Orchardgrass suffered nearly complete stand loss while reed canarygrass stands were only 25%. Smooth bromegrass stands were intermediate and averaged 56%. Quackgrass should be considered as an alternative to reed canarygrass when grass persistence and ground cover are important. While less persistent than quackgrass, smooth bromegrass had greater forage yield and nutrient uptake. *Author: Craig Sheaffer, Univ. of Minnesota Agronomist*

Hay Land Share Rental Agreements

Determining a fair rental agreement on hay land is a complicated issue. The complexity is due largely to the variation of two key factors, crop yield and crop value.

The other factor to consider is the cost of making the hay, the value of each field operation necessary to put the crop into a salable form. Though these costs vary from farm to farm, a common method of determination is to use the average custom rates. This isn't a perfect method, but using a custom operator is a viable option for the landowner if they are unable to perform the field operations and are not averse to marketing the crop.

Historically, hay land share rental agreements provide the tenant with 40% of the crop and the remaining 60% for the landlord. With this arrangement, the landlord is responsible for fertilization and establishment expenses. If these expenses are shared, the landlord often receives 40 to 50% of the crop.

Table 1. Cost of field operations.

Cutting&conditioning/acre	$11.80
Raking/acre	$5.65
Baling/bale	$9.20
Moving to storage/bale	$3.10

If using average custom rates, the next consideration is the cost of field operations. Table 1 shows average custom rates for each operation and represents the contribution by the tenant. Note that cutting and raking are valued ***per acre*** while baling and moving are ***per bale***. This assumes a 1500-lb round bale; the cost for small or large square bales may differ.

The various field operations will affect the cost for each ton of hay produced. Table 2 shows the cost per ton of hay (per cutting) at various yields using average custom rates. Note that cost per acre increases as yield increases because the cost of baling and moving are calculated on a per bale basis. More yield, more bales. Yield has little impact on the cost of cutting and raking.

Table 2. Field operation costs per ton/acre/cutting.

0.5	0.75	1.0	1.25	1.5	2.0
$26	$30	$34	$38	$42	$50

The final consideration is the value of the hay. Both value and yield affect the portion of the crop that would need to be sold to cover the cost of custom field operations. These values are shown in Table 3. For example, if one ton per cutting was sold for $100/ton, 34% of income would be needed to pay for custom field operations.

Using the custom rate approach, the landowner is responsible for all production expenses, including fertilization, lime, wood ash, and the cost of new crop establishment.

The cost of new crop establishment is high and must be considered. Using the custom rate approach, the cost of converting an old stand into a new stand would likely run $125 to $150/acre. This assumes the cost of spraying, plowing, disking, cultivation (3x) and planting 10-12 lb/acre of alfalfa and 3-5 lb/acre of grass. The actual cost will vary with seed selection. This does not include the cost -- or value -- of an oat nurse crop, nor does it include the cost of soil amendments such as fertilizer, lime or wood ash.

A fair share agreement is affected by hay yield, hay value and current custom rates. The difficulty is finding the middle ground acceptable to both tenant and landowner when hay yield and value are moving targets that vary each year. The most sustainable agreement will be one in which each party realizes an adequate return to their contribution and is willing to make concessions when these targets move in the wrong direction.

Table 3. Value of field operation costs as a percentage of hay sale values at various hay yields.

Hay Value	Hay Yield/Cutting (ton/acre)					
	0.5	0.75	1.0	1.25	1.5	2.0
$/ton	——————— % ———————					
50	51	60	68	76	84	101
75	34	40	45	51	56	67
100	26	30	34	38	42	50
125	21	24	27	30	34	40
150	17	20	23	25	28	34

Author: Jim Stordahl, stordahl@umn.edu, Extension Educator, Polk/Clearwater Co.

High-Quality Grass for High-Producing Dairy Cows

Improved management for high quality, advances in equipment, and innovations related to bale silage and other storage options have made grass silage a more attractive option for dairy farmers. Grasses also have significant nutrient management benefits, particularly regarding manure management. While species and variety selection as well as fertilization issues are important, harvest management will determine the success or failure of grass silage as high producing dairy cow forage.

There have been few studies in the USA with cows fed predominantly perennial grass-based TMR's. We have conducted a number of these grass feeding trials with medium to high producing cows. Rather than use forage to concentrate ratios, which favors the higher quality forage, rations were balanced for maximum NDF in the diet that would not limit intake. This allowed most cows to attain their intake potential with optimal ruminal fills. It also maximized the use of homegrown feeds, which had a favorable impact on farm nutrient balance.

Here is a summary of the results from our Cornell dairy feeding trials (all published in research journals):

1. Grass fiber digestibility affects intake and milk production of cows fed diets similar in chemical composition but varying in ingredient composition
2. Grass-based TMRs produced similar quantities of milk as alfalfa -based TMRs
3. Dry matter intake increased as the portion of concentrate in diets increased, resulting in higher milk production in high tall fescue diets compared to high alfalfa diets
4. Comparing starch vs. sugar supplementation of grass-based diets, the NFC source did not influence intake or milk production, but sucrose feeding lowered N utilization efficiency, when replacing a portion of the high moisture corn in the diet.
5. Tall fescue- and orchardgrass-TMRs performed as well as alfalfa TMR, but grass-based rations requires more concentrate than alfalfa-based rations.

Grass silage can produce as much milk per cow as alfalfa silage when rations are balanced. We observed no palatability problems with endophyte-free tall fescue. Milk production per cow is a major factor determining dairy farm sustainability/ profitability. Including non-fibrous carbohydrates (NFC) in the range of 35 to 42% of dietary dry matter is a popular way to increase energy density and thus milk production. Balance of carbohydrates in the diet impacts milk production because it affects amount and ratios of ruminal volatile fatty acids produced, which in turn alters metabolism and partitioning of nutrients.

In the above studies, the higher the fiber in the forage, the more concentrate in the diet. This resulted in generally higher intakes and higher milk production. Higher concentrate feeding results in a shift toward propionic acid production by ruminal microbes. Propionic acid is used by the mammary gland to produce lactose, responsible for milk volume, which accounts for milk production of cows fed grass being as high as those fed lower-fiber alfalfa. Differences in DM intake and subsequent milk production can also be attributed in part to differences in fiber digestibility and indigestible residue due to lignin differences, as well as to differences in NSC.

Using the results from one of the feeding trials above, the impact of corn grain price on economic return per cow per day for diets varying in forage:concentrate ratio can be estimated. When all other costs are kept constant, as might be expected, the higher the forage:concentrate ratio, the lower the impact of increasing corn grain prices.

Grass species and variety evaluation should be focused on maximum yield at optimum silage quality. A harvest date target based on optimum forage NDF for the class of livestock being fed is the goal. A three-cut management is suggested in the Northeast, with the first two cuts taken at optimum NDF, followed by a fall cut for dry cow forage.

New tall fescue varieties should be seriously considered for dairy systems in the northern USA, particularly those that combine grazing with silage options. The benefit of novel endophyte varieties for northern states, however, has yet to be shown. Over 85% of the alfalfa acreage in New York State is sown in mixture with perennial grasses; such mixtures should lead to a better balance of ration ingredients to maximize total intake. A proper balance of grass and non-fibrous carbohydrates in the diet should increase intake and maximize milk production. In summary, high-quality perennial grasses can fit well in the rations of high-producing dairy cows.

Authors: Drs. Jerry and Debbie Cherney, Agronomist and Dairy Scientist, Cornell University. Dr. Jerry Cherney is speaking at the 2009 MN Forage Days at Floodwood Feb. 10, Detroit Lakes Feb. 11, Royalton Feb. 12, and Rochester Feb. 13.

2009 MN Beef Cow/Calf Days Feb. 9-13 & 17-20

Program theme is COW SIZE; Keynote speaker is Dr. Bryan McMurry, Cargill.

Please pre-register 1 week in advance; $25 per family/farm.

Feb. 9 Mora Fish Lake Resort, 5:30-9:30, 320-225-5050

Feb. 10 Staples Central Lakes College, 9:30-3:00, 320-732-4435

Feb. 10 Bagley American Legion, 5:30-9:30, 218-694-6151

Feb. 11 Lancaster American Legion, 5:30-9:30, 218-843-3674

Feb. 12 Baudette Sportsmen's Lodge, 5:30-9:30, 218-327-5958

Feb. 13 Grand Rapids Itasca Comm. College, 5:30-9:30, 218-327-5958

Feb. 17 Glenwood Minnewaska Lodge, 9:30-3:00, 320-231-7890

Feb. 18 Pipestone MN West Comm. & Tech College, 9:30-3:00, 507-825-6715

Feb. 19 Rochester Holiday Inn South, 5:30-9:30, 320-225-5050

Feb. 20 New Prague KC Hall, 9:30-3:00, 507-332-6109

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Alternative Forages for Dry Dairy Cows

Dairy cows typically produce milk for about 305 days followed by a 60-day dry period during which the cow prepares to give birth again signaling the beginning of the next lactation. Developing and implementing a successful dry cow nutrition program should be a high priority for dairy producers.

Offering cows the best opportunity for a smooth and successful transition into lactation is critically important to cow health, longevity and farm profitability. Despite many years of research, nutritionists, dairy producers, and veterinarians are still trying to clearly define optimal diets for dry cows.

Overfeeding energy during the dry period leads to increased deposition of visceral fat, insulin insensitivity, and a potential reduction in metabolic machinery associated with glucose production and fat metabolism. Overfeeding of energy during the dry period has been associated with energy disorders such as ketosis and fatty liver. Research conducted at the University of Illinois and elsewhere has demonstrated that feeding moderate-energy, high-forage diets to dry cows can ease the transition into lactation.

Forages provide the foundation for a successful dry cow diet, however, limited research has compared forage sources for dry cows. Forages that are considered candidates to be included in dry cow diets should be moderate in energy density, palatable, consistent quality, and have an appropriate mineral profile.

One challenge for nutritionists is to formulate diets using on-farm ingredients that do not greatly exceed the energy requirements of the dry cow. Forages fed to lactating cows are often too high in energy, starch, and contain excessive minerals (potassium) for dry cow diets. Forages that are high in potassium should be used in limited quantities to minimize the risk for milk fever.

There is likely no single perfect forage for dry cows. Corn silage is a common low-cost ingredient that is highly palatable, has moderate crude protein content, and is low in calcium and potassium, however by itself is too high in net energy of lactation and starch and has a low fill factor. Cows consuming a high corn-silage diet will likely overconsume energy, become obese, and may be at risk for metabolic disorders postpartum.

Lower energy forages such as wheat straw, grass hay, sorghum silage, corn stalks, and earless tropical corn may be useful for diluting the energy density of the diet to meet but not greatly exceed energy requirements for dry cows. Cows consuming a high-forage diet containing approximately 50% NDF (neutral detergent fiber) will fill up before they over-consume energy.

Challenges exist with processing bulky forages appropriately to prevent cows from sorting them. Forages must be processed to less than 2" in length and incorporated into a total mixed ration to ensure that cows will consume them. Diets that are readily sortable will result in the cow consuming a diet that is different from the one that is intended and may contribute to metabolic disorders. In addition to diluting energy density, bulky forages such as wheat straw, may also have advantages in improving muscular tone in the rumen, maintain feeding behavior and rumination patterns that parallel feeding behavior during lactation.

Research comparing dry cow diets based on wheat straw or orchardgrass is currently being conducted at the St Paul dairy teaching and research center.

Author: Noah Litherland, Extension Dairy Scientist, UMN Extension

MN Hay Auctions by *Krishona Martinson, UMN Equine Extension, www.extension.umn.edu/horse*

Belle Plaine Commission Hay Sale, **Belle Plaine**	952-873-2292	Hotovec Auction Center Hay Sale, **Hutchinson**	320-587-3347
Bostrom's Hay Auction, **Isanti**	763-444-9256	Lake Region Coop Hay Sale, **Maple Lake**	320-963-6804
Cannonball Hay Company, **Randolph**	507-263-3396	Quality-Tested Hay Auction, **Sauk Centre**	320-760-2979
East Central Livestock Hay Sale, **Mora**	320-679-4333	Quality-Tested Hay Auction, **Litchfield**	320-693-9371
Farm Country Coop Hay Auction, **Pine Island**	800-356-8313	Quality-Tested Hay Sale, **Caledonia**	507-725-5807