Sorghum-Sudangrass is a hybrid cross, although there are multiple varieties available. They resemble Sudangrass, but are generally taller, have larger stems and leaves, and are higher yielding. Sorghum-Sudangrass hybrids regrow after each grazing with proper environmental conditions. These can contain prussic acid. Brown mid-rib varieties have shown higher animal preference and performance.

Pearl Millet does not produce prussic acid. It tends to have smaller stems and more leaf than the Sorghum grasses. Pearl Millet regrows after each harvest, but not as rapidly as Sudangrass or Sorghum-Sudangrass hybrids.

Fertilize all three according to soil test results similar to corn with a target of 100-150 bu. They can be no-tilled or broadcast into a prepared seed bed. Plant each at a rate between 25-30 lbs. to the acre. All of these summer annual grasses can be grazed or even cut for silage. These summer annuals should be grazed after they are 18-inches tall. Grazing earlier has concerns with prussic acid or nitrates and will weaken the plants. Trampling and wastage will increase when grazing is delayed past the boot stage. Plants reach the grazeable height of 18 to 30 inches about six to eight weeks after planting. Rotational grazing or strip grazing management should be practiced. A high stocking density should be used to graze the grass down in less than 10 days. Clipping leftover stems down to 8 inches will improve forage quality for the next grazing period.

Teff is a summer annual grass from Ethiopia. It can grow well in low moisture conditions. It is a fine stemmed grass that can be grazed in about 50 days and re-grazed about 45 days after the first grazing. Plant it at a rate of 4-5 lbs. to the acre. Use 50 lbs. nitrogen as a starter. Check out the Cornell University fact sheet for more information: http://nmsp.css.cornell.edu/publications/factsheets/factsheet24.pdf
The Purdue Forage Management Day will be held at the Purdue Diagnostic Training Center at the Purdue Agronomy Farm, northwest of Lafayette, on Thursday, September 4, 2008.

The 2008 Northern Indiana edition of Grazing 102 will be offered at the Fulton County Historical society, 37 E 375 North, Rochester, on Friday and Saturday, September 5 and 6.

The planning committee, Kelly Easterday, Linda Hixson, Susannah Hinds, Mark Kepler, Jerry Perkins and Dan Rosswurm, has enlisted the assistance of twelve speakers to discuss many facets of forage and livestock production. The program and registration form are on the following page. This program is designed to assist producers understand the fundamental concepts of a Management Intensive Grazing system and how to successfully make it work in their own operation regardless of livestock species. Participants and speakers will focus on animal grazing techniques for Northern Indiana.

Questions and requests for additional registration forms should be directed to:
Mark Kepler, 1009 W. Third Street, Rochester, 574-223-3397, mkepler@purdue.edu

Heart of America Grazing Conference
Holiday Inn in Columbus, Indiana
January 21 and 22, 2009

Speakers for the conference include:
Keith Johnson Susannah Hinds
Joel Salatin Robert Zupancic
Ray Smith Garry Lacefield
Charlie Carter Roger Dale Robinson
Dave Nuhring Lori Snyder
Mike Neary

There will be a trade show and a silent auction.

Mark these dates on your calendar and watch the agricultural newspapers. Details will be included in the winter issue of the Hoos-Your newsletter.
Grazing 102 Program Schedule

Friday, September 5
9 a.m. Registration
9:30 a.m.—Welcome
   Mark Kepler, Purdue CES-Fulton County
9:40 a.m.—Why Rotate?
   Jerry Perkins, NRCS Grazing Specialist
10:00 a.m.—Grazing Economics
   Dave Robison, CISCO Seeds
11:00 a.m.—Matching Winter Livestock Needs with Forage Quality, Using Alternative Feeds
   Dr. Ron Lemenager, Purdue Beef Specialist
12:00 p.m.—Lunch
12:45 p.m.—Roots, Leaves, Sun and Grazing
   Susannah Hinds, NRCS Grazing Specialist
1:30 p.m.—Pasture Walk—Roger Rose Farm
   Water...You want how much? Where?
   Dr. Steve Hawkins, Purdue Ag Centers
   Pluses and Minuses of Different Forages
   Dr. Keith Johnson, Purdue Forage Specialist
5:15 p.m. Recess for the day

Saturday, September 6
8 a.m.—Pasture Fertility
   Dr. Steve Hawkins, Purdue Ag Centers
8:45 a.m.—Fencing
   Doug Shaffer, Tru-Test
9:30 a.m.—Health Issues Associated with Grazing Animals
   Dr. Derek Klopfenstein DVM
10:30 a.m.—Animal Behavior and Grazing
   Dr. Ben Bartlett, DVM Michigan State University
12:00 p.m.—Lunch
1 p.m.—Continuation of Animal Behavior and Pasture Walk
   Lonnie Carrico Farm
2:30 p.m.—Forage Identification
   Ed Heckman, Purdue Extension Educator, Retired
Return from Farm
3:30 p.m.—Producer Panel
   Toby Jordan, Beef
   Steve Hooley, Dairy
4:30 p.m. Evaluation
Adjourn

2008 Grazing 102 Registration Form

Name ____________________________
Address __________________________
Telephone __________________________
Email Address __________________________

Names of Additional Members Attending:

Registration Fee is $65/person
(Includes handouts, meals, and resource materials)
Additional members from the same operation or family—$30/person
Registration Deadline: August 29.
Please add $10/person late fee after 8/29/08

Number Attending: ________
X_____ $65/person = $________
X_____ $30/additional person* = $________
X_____ $10(late fee)/additional person = $________
Total Enclosed = $________

* Additional person from same operation will not receive the reference materials unless full price is paid.

Registration is due August 29, 2008
Please make your check payable to:
Purdue CES—Fulton County
Please mail to:
Purdue Extension—Fulton County
1009 W. Third Street
Rochester, IN 46975
Purdue University Forage Day: Hay Today, Money Tomorrow

The 2008 Purdue University Forage Day will take place June 26 in Grant County near Jonesboro, Indiana, on Gary and Ann Hodupp’s farm. Registration will begin at 8:30 a.m. at the farm, 7340 S 400 East. The farm is west of I - 69 and north of hwy 26. Look for signs.

Purdue Forage Day is free and open to the public. Topics for the morning program include:

* Determining the proper amount of fertilizer to apply to fields for high yields.
* Double crop fields after the harvest of winter wheat grain, a potential way for farmers to be more efficient with the land as a resource.
* Indiana sales tax regarding forage and how it is being sold.
* Co-ensiling forages and distiller grains
* Attributes of a cellulosic biofuel forage crop
* What size hay harvesting equipment does your farm need?

The Hodupps have been planting and harvesting alfalfa-grass mixes and hay for more than 20 years. Their plans are to continue in the future.

"One of the reasons that we farm is to, hopefully, one day, be able to pass on our family business to our kids," Ann Hodupp said.

Keith Johnson, Purdue forage specialist, said, "The strength of Purdue Forage Day is that we do not have it in the same location year after year. We rotate to different regions in the state, and discuss best management practices and showcase new forage harvesting technologies available to farmers."

Hay harvesting equipment demonstrations will take place after lunch.

More information about Purdue Forage Day is available at http://www.agry.purdue.edu/forageday/index.html.

For questions, contact Keith Johnson at (765) 494-4800 or johnsonk@purdue.edu.

Purdue Forage Day is sponsored by Purdue University Extension and the Indiana Forage Council.
Placing Bales for Winter Feeding

Jim Gerrish

Americangrazinglands.com
This article was written while Jim worked at the Forage Systems Research Center in Missouri

The focus of this article is a system for large round bales that we use both at Forage Systems Research Center and my own farm. In this system, we try to only handle a bale once, moving it from where the baler deposits it to where it will be fed. The basic set up of the feeding system is illustrated below. Large round bales are pre-set prior to winterfeeding time to reduce labor, tractor usage, and pasture damage from running trucks or tractors in the pasture during muddy times. The pasture can really be any size and the number of bales set in the pasture can be varied. We generally figure one ring per 12 to 15 cows with a 1000-pound bale lasting 2 to 3 days depending on exact cow number per ring. Bales are spaced on 20-foot centers with the number of bales set per paddock based on the herd size and planned length of stay. If there are 50 cows in the herd and you want to move them about once a week, then you would need eight 1000-pound bales (50 cows * 35 lbs hay/cow/day * 7 days = 7350 lbs) and four bale rings. A temporary fence of polytape is used to protect the remaining bales from the cattle during the feeding period or if the paddock is being grazed during the growing season. If the ground is frozen and step-in posts won't step in, just stick them in the sides of the bales.

We prefer to use untreated sisal twine for the bales that are set in place during summer. It is critical that twine spacing be kept to less than three inches to minimize storage waste. Net wrap and plastic twine must be cut off the bales and the remaining net wrap picked up after feeding. It adds one more step to the feeding process and reduces efficiency. Plus I'm just cheap and lazy. The narrow twine spacing provides excellent storage protection for grass dominant hay. For high legume content hay that must be stored indoors, a modified spaced-bale system can be used. Most hay deterioration occurs during summer and fall, not winter. Large square bales of alfalfa or other legume dominant hay can be stored indoors and then be pre-set at the beginning of winter. Even setting a month's worth of hay at a time is much more efficient than feeding on a daily basis. We have compared the time required to feed 8 bales at a time with spaced-bale feeding to taking hay from a barn, transporting it with an 8-bale mover, and feeding it in rings. One person can feed 6 pre-set bales in 12 to 15 minutes while the barn-stored hay feeding system required 40 to 45 minutes.

While the system has for the most part proven very effective in accomplishing those goals, it does have its drawbacks. One consideration is that the longer cattle are in the same paddock, the more damage they will do to that paddock. For this reason, I prefer a small number of bales in many paddocks rather than large number of bales in just a few paddocks. During the coldest part of winter when the ground is reliably frozen, cattle may stay a month or so on the same paddock, but when the spring thaw comes, I prefer to move them every few days. If severe trampling damage occurs around the feed rings, light diskimg or harrowing may be required to smooth the ground out and re-establish forage. Our general experience has been that this is not necessary.
Electric Fence Review

Rory Lewandowski, OSU Extension Educator, Athens County

For graziers using rotational grazing, the electric fence is a critical component of the total system. I know of examples where just 1 or 2 strands of electrified high tensile wire are serving as a perimeter fence along a road. The grazier is trusting in the electrical system and the prior experience/training livestock have received to insure the fence is not crossed. In wet years, there are a lot of electrical fence systems that can do an adequate job. Soils with good moisture insure that the animal is well grounded, and when wet nose meets a wire, even if the voltage is not high, a good circuit is made and the resulting shock can convince an animal that the grass is not really greener on the other side. In dry years, marginal electrical fence systems may not maintain the desired voltage. Dry soils don’t provide the same grounding between animal and fence. Fences that might not be challenged in a year with plentiful forage may be tested in dry years with limited forage growth. During dry years we talk about slowing rotations down and even holding animals in one paddock as a sacrifice area until grass growth allows the rotation to be resumed. Can your fence keep your livestock from moving to where the grass really is greener?

Although many graziers have learned the basics of electric fencing, most of us can benefit from a review every now and then. The basic components of your electric fence system that should be evaluated include: the fence energizer/charger, ground rods, and the fence wire. In grazing schools you will hear that the fence energizer/charger is the “heart” of the electric fence system. The beginning grazier will avoid some frustrations by spending the necessary money for a high quality energizer/charger. When the time comes to replace the current energizer/charger, this is not the place to cut budget corners.

Size the energizer/charger to handle your current fencing system, plus some room for growth. I know graziers that have significantly increased the amount of electric fence they are running over the years. Sometimes the fence has increased as a result of expanded pasture acreage; sometimes the fence has increased as a result of more internal divisions as paddock numbers increase. Sometimes, it is both. As the amount of fence grows, graziers should check to make sure that the energizer they have is adequate for the amount of fence they are asking it to charge.

Graziers should be checking the voltage on the fence to make sure it carries a voltage adequate to deter livestock from crossing. Figures that I have heard thrown around regarding voltage levels and various livestock species include 1600 to 2000 volts for cattle, 3000 volts minimum on electric netting for sheep and goats and 4000+ volts on high tensile fence for sheep/goats. I also know of sheep/goat producers who maintain 7000+ volts on their fence. The point here is to evaluate the charger/energizer as fencing needs grow/change and either fence to include another charger/energizer in the system, or add a larger charger/energizer to handle the increased fence. There are many ways to evaluate chargers/ energizers, but one method is to look at output in joules. Also remember that when a product is advertised by the miles of fence it can energize, this includes one wire. If multiple wires are energized, these must be added together. Four strands of high tensile wire around a mile perimeter with 2 hot strands accounts for 2 miles of energized wire.
One component of the electric fence system that is sometimes overlooked is the ground rods. The full capacity of the charger/energizer will not be utilized unless there is a good ground system in place. In a dry year, it is critical to have the correct number of ground rods, properly spaced and installed to help keep enough voltage on fences. What is the correct ground rod system? A general rule of thumb says to install a minimum of 3 feet of ground rod per joule of energizer output capacity. For example, if I have a 15-joule energizer, this requires 45 feet of ground rods. Generally either galvanized or copper rods in 6 to 8 foot lengths are used. This energizer would require 6 to 8 ground rods depending upon whether a 6 or 8-foot ground rod was used. If copper rods are used, make sure to use a copper wire from the energizer ground terminal to the ground rod. If different metals are mixed, electrolysis can occur and the effectiveness of the grounding system is reduced, so stick with either galvanized or copper. Ground rods should be driven in their full length, or if rocky soils don’t permit this, driven in at an angle so that essentially the rods are lying in a trench. Ground rods should be at least 10 feet apart and 40 to 50 feet away from any other existing grounds. Ground rods should be tied together in a system, connected with wire between rods. Try to locate ground rods in an area that is likely to stay moist. Northern exposures under building drip lines often work well. In drought situations, it may be a good idea to water your ground rod areas to increase the effectiveness of your electric fence.

Finally, evaluate the fence itself. Remember that as the diameter of the fence wire decreases, there is more resistance to push electric current around the fence. Polywire is very handy stuff, but it should not be used to carry the charge long distances. Use high tensile wire to carry the charge and for perimeter fencing and polywire to hook on to the high tensile wire for internal paddock divisions. Graziers should also be aware that if barbed wire is used in an electric fence system, each of those barbs is siphoning off some of the electricity. Efficiency is reduced. Voltage will be dropping in the fence as distance and amount of fence increases. Check to make sure the galvanized coating on the fence wire is intact. Rust is an enemy of electric fences.

Electric fence technology has allowed many graziers to more effectively utilize pastures and their management ability. Graziers need to periodically evaluate the energizer, ground rods and fence wire components of their electric fence system to insure fences are operating efficiently and serving as effective barriers for livestock.

References: Beef Cattle Handbook, BCH-6201: Fence Systems for Grazing Management and Kencove Farm Fence Supplies Catalog

All programs and services of the Hamilton County Soil and Water Conservation District are offered on a nondiscriminatory basis without regard to race, color, religion, sex, age, marital status or disability.

This newsletter is financially supported by the Indiana Grazing Lands Conservation Initiative (GLCI). The mission of GLCI is to provide high quality technical assistance on privately owned grazing lands on a voluntary basis and to increase the awareness of the importance of grazing land resources. A coalition of individuals, livestock organizations’ representatives, and agency personnel carry out the activities of this volunteer organization.
Graziers’ Comments
Ed Heckman

Water lines are about the lowest cost and easiest part of grazing from our experience.  
Rick Williams, WI

Remember that pasture is usually short in three things -- energy, fiber, and by-pass protein.  
Fred Owen, Ohio

Every grazing day reduces fossil energy and human energy.  
Allan Nation, MS

If done properly, grazing can reduce the farm’s demand for fossil fuel as well as all pesticides.  
Richard Winnett, NY

Dr. David Combs, University of Wisconsin-research, had graduate students study both confinement cows and grazing cows. They observed how many bites cows took per minute, how much was consumed in confinement feeding (weigh back the refusal) and did the best they could to measure how much grazing intake took place (before and after plate meter). In both confinement and grazing, Dr. Combs observed that "cows get tired of eating before they're full".

"Never desert your own line of talent. Be what nature intended you for, and you will succeed." - Sydney Smith

"I don't think there is any richer reward in life than helping someone. You can't measure it in money or fame or anything else - but if you were not put here for anything else but to help each other get through life - I think that is a very honorable existence." - Tom Brokaw

I expect to pass through the world but once. Any good therefore that I can do, or any kindness I can show to any creature, let me do it now. Let me not defer it, for I shall not pass this way again.  
Stephen Grellet, French/American (1773-1855)

One thing I’m trying this year is mowing ahead of my cow/calf group in over-mature pastures with a disc mower and windrowing. I can get the cows to clean things up that way, and the pasture looks great afterwards.  
John O’Donnell, ME

Animals spend about eight hours grazing, eight hours ruminating and eight hours resting. They cannot make up for poor forage management by grazing twenty-four hours a day.  
Darrell Emmick, NY

Whether a man is disposed to yield to nature or oppose her, he cannot do without a correct understanding of her language.  
Jean Rostland, 1894-1977

We can do just about anything we want as long as we stick to it long enough. Unknown

If stockpiled forage is strip-grazed properly, an acre per cow should provide a 75- to 90-day feed supply.  
Mark Kennedy, MO

Grass doesn’t grow well until the soil is over 4 percent organic matter.  
Charlie Opitz, WI

We have found that as we increase the number of subdivisions per farm, the more grass we have.  
Our round bales are fed in the paddocks where they are made to recycle soil nutrients. The bales are pre-positioned so that they can be fed without the use of machinery.  
Tauna Powell, MO
Manage Your Pasture's Nitrogen Cycle
Jim Gerrish
americangrazinglands.com

While legumes can put quite a bit of nitrogen (N) into a pasture, just how effectively are you as a grazier recycling N in your pasture system?

Whether it comes from legumes or fertilizer, N in pasture can be recycled for new pasture growth. The more effective job you do of managing the natural N cycle, the less money you'll spend on N fertilizer.

While cattle consume a lot of N as protein in the forage, less than 5% of the N is retained in their bodies. The rest is excreted as either dung or urine.

When the diet protein level is close to what the animal needs, the excreted N is split equally between dung and urine with the fecal N being slowly released as manure decomposes. Almost all urinary N is readily available in the soil.

As the protein content of the pasture increases, most of the extra N passes through the urine, making urine a potent N fertilizer. If you've noticed dark green patches of green in your pasture, it's because urine has the N-fertilizer equivalent of 200-1,000 lbs. N/acre in that little patch.

Because most of the N in urine is in a urea form, N can be lost to the atmosphere as ammonia gas, just as with urea fertilizer. Hot, dry soils lose a lot more ammonia than cooler moist soils.

As the urine remains in contact with the soil, the ammonia is converted to ammonium, a positively charged ion, and it becomes bound to the soil. However, as ammonium in the soil is converted to nitrate, it can also leach out of the soil, especially on sandy soils. So even though most of the N consumed passes through the animal, over half of it can easily be lost from any further potential as a fertilizer. These loss pathways are why we have to continually add N to soils.

Grazing management that leaves more of the soil covered with green plant residual or dead litter keeps the soil cooler and enhances urine infiltration rate. Good grazing management traps a lot more N in the soil and reduces the ammonia loss, leaving more N in the soil to support the next plant growth cycle. Short grazing periods that leave taller residuals after grazing result in a much more
effective nutrient cycle, compared to grazing shorter through a longer grazing period.

Changes in grazing management can make big changes in the effectiveness of the N-cycle. On continuously stocked pastures you may have noticed the urine spots seem to be scattered and don't really affect large areas of the pasture. Nutrient cycling research has shown that as little as 2-5% of the pasture area may be affected by cattle urine in a single grazing season. No wonder urine spots just serve as a reminder of how desperately the pasture needs N.

Graziers using high-intensity, short-duration grazing notice much more uniform pasture growth following a grazing period of just a few days. Research shows that in a short-duration grazing system, as much as 50% of the pasture surface area may be affected by urine in a single year. This produces a much more uniform pasture; and when cattle pass through a pasture the next time, they tend to graze more uniformly.

In a continuously grazed pasture with typical stocking rates for the Midwest, the effective N application rate from cattle urine is less than 1 lb./acre/day. This level does little more than feed the soil microbes.

At the opposite end of the spectrum is a grazing system where cattle are moved to a new paddock every day. In this scenario, the effective N-fertilizer equivalent from urine is around 50 lbs./acre/day -- a fertilizer rate that will really make grass grow! Other stocking scenarios fall between these two extremes.

A twice-weekly rotation puts about 20 pounds per acre of readily available urinary N on the pasture. If the pasture has 30-40% legume in the pasture, the combined effectiveness of legume-fixed N and recycled urine can support a relatively high level of productivity. Several university studies around the U.S. indicate a well-managed legume pasture with effective nutrient cycling produces yields comparable to applying 100-200 units of N/acre.

With cost management an ongoing concern for most beef producers, taking nutrient-cycle management seriously is a key step to reducing or eliminating fertilizer costs.
Editor’s Note: Clipping of pastures is a frequent topic at pasture meetings. Below are some comments from a thread on this topic on a listserve in May.

Hi everyone:
I just finished clipping my first paddock for this year. I have never clipped this early before. I usually allow my dairy cattle to run through all the paddocks twice before I start clipping, and that is normally right after first cut hay is finished (about the end of June). The main purpose of clipping has always been to cut off the grass that is in head and to cut off the weeds. This year I thought I would try an earlier clipping and see how well it works to encourage young new growth.

Of course, whenever I sit on the tractor clipping pastures, many questions come to mind. Questions like: how high or low should I clip? Should I just leave the clippings on the ground or should I try to bale them? Maybe I should clip with a crop-chopper and blow the clippings in a wagon to be fed to heifers? or maybe pack them away in an Ag-Bag? Maybe I shouldn't clip at all and just use a leader / follower system instead? If I cut too early in the season, will the grasses and legumes have enough root reserve to grow back?

I've been rotational grazing for 20 years and I must say that clipping sure makes the paddocks look a lot better.

Bill Los  Listowel, Ontario, Canada

Have you ever fed good hay to cows on lush pasture and then watched them come running for it?

If you graze at 2,800 kg DM /ha (2,500 lb/a) and allocate the right size area, you should never have to clip.

Otherwise, mow 1/4 of the paddock up to 12 hours before grazing. Fence cows onto the wilted pasture area before giving them the whole paddock. Once trained to the wilted pasture, many will eat it first, so there is no need to be fenced on it.

Mowing ahead of grazing is cleaner, wastes very little grass, reduces facial eczema spores, doesn't spread parasites over the pasture (which, unless it rains, animals dislike, so eat less) and cows eat more (less moisture bulk)and produce more. After four rounds, the whole paddock is topped.

Vaughan Jones  Hamilton, New Zealand

Clipping before grazing means your cows will eat everything instead of leaving the seed heads/stalk and less desirable grasses. This boosts their total intake slightly and keeps your pastures from seeding out too early, hence grass quality is higher. You can achieve higher grass quality by clipping after grazing, but your cows are still picking the best bits and not utilizing the stalk etc.

We try to clip right before afternoon milking (no more than twelve hours) or have someone start clipping during milking before the first cows get to the paddock.

As for clipping height, one needs to find a balance between keeping pasture quality high, and maintaining good growth. Clipping low is good for quality, but will hurt your annual pasture production. Clipping too high will not achieve good pasture quality which is the main aim of clipping.

Bill and Michelle Burgess  Te Awamutu, New Zealand

You could subdivide the paddock and mow ahead of the cows. Start at the water source. No need to back fence.

Clay McQuiddy, Missouri
Feeding Hay Helps to Fertilize Pastures

Hay producers are providing beef customers with more than just feed value -- beef producers often overlook the fertilizer value of the hay being fed. So says John Lory, University of Missouri, Environmental Nutrient Management Specialist.

A ton of fescue hay contains about 40 lbs of nitrogen (N), 15 lbs of phosphorus (P) and 40 lbs of potash (K), he says. Many of these nutrients pass through the cattle -- non-lactating cows return the equivalent of almost all fed nutrients back to the pasture. Some of the N is lost, so ultimately about 25% of the fed N and all the fed P and K have fertilizer value. The nutrients in a ton of hay are enough to match the P and K nutrient removal rates for one acre of pasture. The fertilizer value of nutrients in a ton of hay adds up to about $15, according to Lory, assuming 40¢ for N, 30¢ for P, and 20¢ for K. (This is based on 2006 fertilizer prices.)

This type of fertilizer only has value if the cow does a good job of distributing its manure around a field. Although cattle tend to deposit most of their manure near feeders and water sources in a pasture, Lory suggests some ways of spreading it. Frequently move feeders and feeding areas around a pasture and increase stocking density of animals. But move them more frequently to prevent over-use of parts of the pasture. Do not use the same pastures for supplemental feeding each year; moving winter feeding areas each year distributes nutrient benefits around the farm.

Producers should also protect water quality by maintaining setbacks between winter feeding areas and streams. Frozen or saturated soil promotes the movement of manure nutrients in runoff.

Printed with permission from Hay & Forage Grower, eHayWeekly newsletter, February 7, 2006