Nitrogen Sources for Pasture and Hay
Sarah Kenyon, Agronomy Specialist

Nitrogen is one of the major nutrients required by forage grasses for proper growth and development. Unlike the other two major nutrients, phosphorus and potassium, nitrogen is not retained in the soil from year to year in the form that forage plants can readily use. Nitrogen applied to the soil is rapidly converted to nitrate-N and is then often incorporated into organic materials, leached out of the rooting zone by rainfall, or lost back to the atmosphere. Selecting the correct form of nitrogen fertilizer is an important choice.

Ammonium nitrate (33-0-0) is a widely used nitrogen source in Missouri crop systems, including hay and pasture systems. The main reason for using this nitrogen source is that there is little potential for volatilization losses of nitrogen from this material. Missouri research supports the use of this fertilizer material; corn, wheat, and fescue crops have increased yield when fertilized with ammonium nitrate as compared to urea. However, availability of ammonium nitrate has become a problem because of regulatory issues and storage problems.

Urea is one of the most commonly utilized nitrogen sources. It contains 45 percent actual N or 45 pounds of N per 100 pounds of fertilizer material (46-0-0). Volatilization loss is of particular consideration for urea-containing fertilizer materials. Research shows that the potential for nitrogen loss as ammonia gas increases as temperature, soil pH and moisture increase, as the rate of application increases, and the time between application and rain greater than ½ inch.

Urea volatilized can increase about four-fold as the soil temperature increases from 45 to 90 degrees F. This information suggests that fertilization of cool-season forages in March would result in lower potential for nitrogen loss than might be realized for fertilization of warm-season forage or for fertilization of fescue in August. Adding Agrotain to urea is especially important for these warm-season forages or for fertilization of fescue for stockpiling in August or early September.

Research from several states supports the use of a urease inhibitor (Agrotain) to avoid volatilization loss. When Agrotain was used on tall fescue over six test sites in Missouri average yield was increased by 330 lb/acre over untreated urea, this is an added value of about $7 per acre. In another research study, ammonium nitrate and urea treated with Agrotain gave consistently high tall fescue yield in both the spring and fall. Untreated urea gave variable results; untreated urea was effective when it rained but was ineffective when applied during dry weather.

Polyurethane coating (ESN, Agrium) and starch gel coating (Nurea) can also be used to minimize urea volatilization, but have variable results. When ESN was used on corn, there was an average 5.5 bu/A increase above urea. However, there was a strong timing effect: 16 bu benefit for January topdress, 10 bu benefit for February topdress, and a 4 bu yield penalty for march topdress, this penalty is likely from being released too slowly. When tested on tall fescue and wheat little, to no yield benefits were reported. Therefore, ESN and mixtures with ESN do not perform as well as other nitrogen sources.

In conclusion, nitrogen fertilizer source does impact Missouri forage production. Ammonium nitrate is still economically better if it is available. Urea with Agrotain performs nearly as well as ammonium nitrate and should be used when rainfall is not imminent. Ammonium sulfate (21-0-0-24S) is another alternative ammonium nitrate and should be used when rainfall is not available. Urea with Agrotain performs nearly as well as ammonium nitrate and should be used when rainfall is not imminent. Ammonium sulfate (21-0-0-24S) is another alternative

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Forage Sampling and Testing
Ted Probert, Regional Dairy Specialist

Forage testing is a practice that has been around for quite a while but it is a practice that is arguably under-utilized. A common question asked by hay growers and livestock producers is “Why should I test my forage?” There are several good reasons to test hay or silage for nutrient content. The information gained through doing so can be very valuable in making forage preservation and feeding decisions.

The first reason to test hay/silage is to gain information that will assist in making the best use of it in your feeding operation. Identifying and categorizing different cuttings by nutrient content can be extremely useful for determining which cuttings or lots to feed to various classes of livestock on the farm. For example, growing or lactating animals have higher nutritional requirements than dry cows. Knowledge of the quality of your hay will help you make the best decisions as to which animals specific lots are best suited for.

Once individual lots of hay have been targeted for feeding to specific groups of livestock, forage test results can be utilized for the purpose of determining whether or not additional supplementation will be needed and if so how much and what type. Rations can be balanced for each group of animals present on the farm according to the forage they will be fed. This is a very important step if a specific level of animal performance is expected. When programming diets for lactating dairy cattle for example, use of forage test results as opposed to book values will typically make a significant difference in inclusion rates and proportions of forage and concentrate ingredients. “Mistakes” in ration formulation when forage analyses are not available can result in the loss of several pounds of milk production and/or significant increases in feed cost. This principle is not as noticeable when feeding animals that are not going through a milk parlor but is at work none the less.

Another reason to test forage is as a monitoring tool of the hay or silage making skills of the grower/producer. I have observed a tendency for some producers to think that their haymaking techniques are better than is truly the case and that their hay is better than it actually is. A forage test can provide an indisputable measure of the job a grower is doing at harvesting and preserving hay or silage. It is just our nature as humans that we tend to do a better job at most any task when we know that our efforts will be evaluated. Such an evaluation can serve as a tool for a producer to use to make changes toward improving forage preservation practices.

Forage test results serve a further purpose when buying or selling hay. For sellers, nutrient analysis can enhance the value and demand of a quality offering. Buyers can purchase with confidence when they know what they are purchasing.

After the decision is made to obtain a forage analysis it is very important to submit a good sample. There is a “right” way to do this, but there are a number of “wrong” ways. It is important that proper sampling techniques be followed in order to assure an accurate analysis of the forage being sampled and tested. The following steps represent accepted procedure for sampling.

- Identify a single lot of hay/silage for testing. Mixing forages from different fields or cuttings will yield meaningless test results.
- Collect the sample using a good, sharp hay probe. Grab samples will generally not be representative of the forage you are testing and will result in inaccurate analysis.
- Sample randomly. Obtain sample cores from a broad group of bales or multiple areas in a silage pit.
- Take an adequate number of cores – from at least 20 bales or separate sites in the silage pit.
- Probe round bales from the side, square bales from the end. Sample cores should be at least 12-18 inches long.
- Following sampling combine individual cores into a single sample.
- Submit about ½ pound sample more or less for testing. It is best to avoid splitting samples. This can result in separation and inaccurate test results.

Forage samples should be submitted to a certified lab. A nationwide list of certified labs can be found on the following web site: www.foragetesting.org.

When submitting forage samples for analysis producers need to be aware that there are two different procedural methods of testing used in the industry – wet chemistry analysis and NIR (near infrared) analysis. It is good to know which method will be used by the lab before sample submission. Both methods will yield accurate test results when representative samples are submitted and proper testing and calibration techniques are used. It is important to remember however, that NIR test results are actually predictions based upon a wet chemistry data base for specific forage types. Forage samples that are not representative of common forages, i.e. grass, alfalfa, or corn silage may be best analyzed chemically.

Within a few days of sample submission the lab will forward test results. If help is needed in understanding the results or using them to balance rations, contact your regional extension livestock or dairy specialist. Or view the resources at extension.missouri.edu/webster/pres-2009-01-15.aspx.

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Be Careful Using Chain Saws this Season
Bob Schultheis, Natural Resource Engineering Specialist

Chain saws are valuable labor-saving devices used on many Ozarks farms and ranches and by homeowners, but in the hands of an untrained operator, they are extremely dangerous. A chain saw at full speed will run more than 20 feet of chain over the bar in the split-second it takes for a user to react.

Injuries from a chain saw are usually ragged and traumatic. More than 40,000 people require hospital treatment each year for chain-saw-related accidents, according to the U.S. Product Safety Commission.

To reduce risk of injury, be sure to match the length of the saw's guide bar to the type of job you expect to do most often. Do not attempt to cut material that is larger than the guide bar you choose.

A guide bar 8 to 14 inches long is good for trimming limbs, cutting small logs and felling small trees. Mid-weight saws with 14- to 20-inch guide bars are used to cut logs and for felling small-to-medium-diameter trees. Heavyweight saws with guide bars longer than 20 inches are for professional use and are not recommended for consumers.

Select a saw that fits your needs, is quiet, balanced, and has the following safety features:

- Front hand guard — The front hand guard is a bar, located in front of the top handle, that stops an operator's hand from slipping and coming into contact with the chain.
- Chain brake — Chain brakes, a feature of gas chain saws, reduce the risk of injury by stopping a chain saw immediately if kickback occurs.
- Throttle trigger lockout — This feature prevents the accidental opening of the throttle.
- Stop switch — The stop switch should be easy for an operator to activate with his or her right thumb while gripping the saw’s rear handle.
- Anti-vibration system or vibration damping — An anti-vibration system can reduce operator fatigue and decrease the strain placed on the operator’s hands. Vibration damping (achieved through rubber bushings and/or metal springs on the saw) reduce the operator’s exposure to vibration.
- Rear hand guard — A rear hand guard on the lower part of the saw by the rear handle protects the operator's hand from a broken or jumping chain.
- Anti-kickback chain — Most consumer chain saws are equipped with low-kickback chains or are designed to have reduced kickback.
- Chain catcher — This feature is designed to catch a broken or jumping chain.
- Continuous pressure throttle — This feature shuts off power to a chain saw when pressure is reduced.
- Muffler — A muffler should limit the noise level of the saw and direct hot exhaust gases away from the operator.
- Spark arrestor — A spark arrestor prevents sparks from being ejected by the exhaust.
- Tip guard — A tip guard is located at the end of the chain saw bar and helps prevent kickback.

Read the operating manual. Many manufacturers also provide video instruction online.

One of the biggest dangers in operating a chain saw is kickback. Kickback occurs when the nose of the guide bar strikes another object and causes a lightning-fast reverse action of the guide bar back toward the operator. It can result in severe upper body, neck or facial injuries or death.

Occasional saw operators as well as professionals should wear protective clothing. Ballistic-nylon chaps or leggings (about $80) can prevent the running saw from coming in contact with your legs. Use safety glasses always. Earplugs or shooter’s muffs provide protection from 90-plus decibel noise that will cause irreversible hearing loss. A hard hat will protect you from falling limbs and flying debris. High-top shoes and gloves with slip-resistant palms are recommended.

Never drop-start a saw. Rather, place the saw on level ground with the bar and chain up out of the dirt. Be sure the saw is held firmly on the ground when pulling the starting rope. Do not operate the saw above shoulder level, and stand out of the direct line of the guide bar when cutting.

We have several excellent guides on chain saw safety and felling trees, Ask for MU Guides G1954, G1958 and G1959 from your county University of Missouri Extension center, or online at extension.missouri.edu/publications. Or see the resources at extension.missouri.edu/webster/pres-2014-04-24.aspx.

If you have questions on this topic or other engineering concerns, you can reach me at the Webster County Extension Center in Marshfield by phone at 417-859-2044, by email at schulteisr@missouri.edu, or go to our website at extension.missouri.edu/webster.

The Importance of Lime
Sarah Kenyon, Agronomy Specialist

Lime is one of the most important additives a producer can apply to a field or pasture. Lime is a soil conditioner that allows other nutrients to become more available through optimizing the soil pH. Taking a representative soil sample is crucial to receiving accurate soil test results and is the first step in correcting soil pH.

Soil samples should be taken every 3-5 years. At least 10-20, 6-inch deep cores should be collected from every field.
Save the date for the annual Beef and Forage Conference 2015

The annual Beef and Forage Conference will be held on February 17th at the West Plains Civic Center. Speakers for this year are Rob Kallenback, State Forage Specialist. Rob will present information on cattle with a ‘fescue gene’, cattle with genetic traits that allow them to perform better on toxic Kentucky -31. Gene Stevens, MU Professor, will present information on a research experiment that took place in Pomona involving phosphorus and potassium fertility in hay fields. Plan to attend this very informative meeting. Further information will be available soon.

Weed and Brush Control for Forages, Pastures and Non-cropland is now available for purchase. Contact your local extension office to order a copy.

Contact information for those contributing articles for this month's newsletter.

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