As many producers have already seen, Nitrogen and fertilizer costs have risen from 100% to as much as 200% over last year. This has prompted many producers to take a closer look at the need to lime and fertilize. While cutting back on certain fertilizer and liming practices will help your immediate economic cash flow, it could reduce your overall profits for the year. Pastures require nutrients to be productive. These nutrients are derived from several sources including residual nutrients in the soil, nitrogen produced by nitrogen fixing organisms in legumes, nitrogen from rain and snow, nutrients derived from the breakdown of manures and organic matters in the soil and lastly nutrients applied from fertilizers and lime.

In some situations a fair percentage of nutrients can be derived from these residual fertilizer sources however seldom can all the nutrient needs be met without some commercial fertilizer application. The only way to know what residual nutrients are available is to soil test. Never has it made more sense to soil test than now!! Another factor that needs consideration is the availability of these nutrients to the plant. While most soils have some level of nutrients present, if the soils are acidic (low pH), the negatively charges particles bind some of these nutrients to the soil so that they are not available for the plant to utilize. In these soils, the most economic beneficial application would be that of lime rather than higher levels of fertilizer. Pastures that have significant percentages of broomsedge are often needing lime or Phosphorus. The only sure way to know is to soil test! Following are a few tips to help make the best economic use of your lime and fertilizer budget:

1. **Soil test.** Even though it will likely take about 3-6 weeks to get your results, you can use a standard recommendation of 50-60 lbs of actual nitrogen (150 -175 Lbs of 33-0-0) per acre and make up any deficiencies in your spring application. Even with the extreme high prices we are currently experiencing on fertilizers, it is still cost effective to apply a standard rate considering the response you will receive and the high cost and limited availability of hay. At $560/ton, 150-175# of fertilizer would cost $42-49 per acre. This application should produce an extra ton of hay which at $40 per bale would be worth about $120. The only true way to know what you need is to know what is available in your soil and what nutrients are needed by the forage you are growing.

2. **Lime.** If you have not limed in the last 2-3 years, chances are you will need an application of lime (1-2 tons per acre). (Especially if you are noticing an increase in broomsedge). Pastures that receive higher levels of Nitrogen to increase yields will tend to become acidic more rapidly requiring more frequent applications of lime.

3. **Utilize livestock and poultry manures** whenever it is economically and environmentally feasible. These sources are often

Continued on page 2
available at a lower cost than commercial fertilizers. There are also by-product and municipal waste sources available that make excellent liming and/or fertilizer sources. However, often there is paperwork required in the utilization of these low cost resources and there may also be a limitation as to how much can be used. There may also be restrictions as to how soon livestock can graze these fields after application.

4. **Apply only the nutrients you need!**

Fertilizers are sold based on the percent Nitrogen (N), Phosphorus (P) and Potash (K) in the blend. 100 lbs of 17-17-17 contains 17 percent Nitrogen, 17 percent Phosphorus and 17 percent Potash. 100 lbs of 18-46-0 contains 18% nitrogen, 46% phosphorus and 0% potash. Many of our soils have adequate levels of Potash. On these soils utilizing 17-17-17 to meet our fertility needs would give us unneeded levels of potash. Soil test and match the ratio of N-P-K in the fertilizer blend you use to the ratio of N-P-K recommended for our soil.

5. **Split Nitrogen into 2 or more applications.**

Soil test reports will give a standard recommended rate of 120-200 lbs of N per year. Nitrogen is very volatile and can move or leach from the soil rapidly compared to P and K. Usually a majority of the Nitrogen applied in a commercial fertilizer is gone in 60 days. Applying all our N in one application would put more N than a crop could use at one time and leave our pastures deficient towards the middle and end of the season giving us a reduced annual yield.

6. **Interseed clovers** into our grass stand to help provide N for our grasses. Clovers are legumes and have the ability to fix Nitrogen in the soil making it available for grasses to utilize. This is an excellent way to economically increase production of our grass pastures. (Legumes do require a higher PH than grasses so be sure to provide adequate lime)

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**Broadcast-Seeding or Frostseeding Clover**

*S. Ray Smith, Harlan E. White, E. Scott Hagood, Dale D. Wolf and Jon P. Repair*

Often, a pasture or hay field has an adequate stand of grass, but lacks clover. The absence of a legume results in poor growth and vigor of the grass stand unless regular applications of nitrogen are applied. Forage quality also suffers. It is certainly not desirable to kill the grass simply to add clover to the mixture since the goal is to have clover make up only 30-40% of the stand. The most practical way to get clover back into such grass sods is to broadcast the clover seed over the sod in late winter.

In order for broadcast seeding to be successful, the existing sod must be grazed or mowed short (so you can see your shoe soles when standing on it). During the fall, kill any perennial weeds that are present and apply lime and fertilizer based on current soil test recommendations. Apply the seed from late January to early March (depending on your location) when the sod is not actively growing and when the soil still has a tendency to freeze. Seeding at this time is called “frost seeding” because overnight frosts followed by daytime thaws will bury the seed at a shallow seeding depth.

It is essential that seeding occur early enough that you still have several weeks of freezing and thawing to “plant” the seed. Leaving livestock on the area to tread-in the seed may also help. This technique works and it is quick, easy, inexpensive, and can be done on steep, rocky areas where tillage equipment cannot be used.

As the existing sod begins to break dormancy and grow, it is important to graze or mow it periodically to prevent it from crowding out the new clover seedlings. Monitoring of grazing height is essential. When allowing livestock to graze, it is vital to prevent overgrazing and damage to new seedlings. Grazing too short will set back new seedlings and have a more detrimental effect than the competition of the existing sod.
Stockpiling Grass for Winter Feed

Most of us have experienced a 40-50% reduction in the amount of hay produce in our first cutting. Those who have tried to buy hay have discovered that quantities are scarce and are significantly higher priced. You most likely will be looking at $25-$40 per bale depending on the type and quality of the hay. Stockpiling your fall grass growth can help you save on winter feed costs and labor. Analyze your pastures to determine which are candidates for stockpiling. If you haven't already taken soil samples, take them now and get them sent off as soon as possible. The following information will help you set up a stockpiling program on your farm for this winter’s forage. If you have any questions or would like some assistance, feel free to contact me at 652-7874.

Stockpiling Principles

Characteristics- Tall fescue is a cool-season perennial grass that can be managed to provide significant grazing during winter months when other grazable forage is in short supply. Fescue is in semi-dormant condition during much of the summer (June- August). In late August it begins to respond to decreasing day length and temperature by increasing its growth rate. The clear, cool days of autumn stimulate the plant to manufacture and store carbohydrates for the winter period. The primary fall growth phase occurs from September through November. Grass produced during these months is some of the best of the year due to its high carbohydrate concentration. If proper management is followed 2,000, to 3,500 pounds of dry matter per acre may be accumulated by mid November.

Stockpiling Defined- Stockpiling refers to management that defers the grazing of forage produced during August through November until later, November through February (when grazing is scarce). Depending on the class of animal and the amount of grass stockpiled, part or all of the nutritional requirements of grazing animals can be satisfied. How long the accumulated grass will last depends on how the grass is allocated to the animal group.

How to Graze- Use electric fence with a strip grazing technique to ration the grass to the animals. If a daily feed allocation is offered by allowing animals to line-up along a temporary polywire fence, 70 to 80% utilization of the forage can be achieved. This is true because very little of the fresh pasture becomes fouled with manure and urine before the cattle attempt to graze it. Furthermore, since the growth rate of fescue is very low from late (about 5 lbs./A/day) November until late February, you don't have to worry about regrowth or 'back fencing' cattle off the pasture area just grazed. Simply move the fence forward. This is also helpful in providing access to water.

How Much Grass?- Deciding on how much grass to offer an animal group can be determined by calculating a feed budget or by trial and error. The easiest way to begin is by setting the fence to provide what you think will be a one day feed supply. This means that the pasture should be grazed uniformly to 2 inches in a 24 hour period. If the grass is grazed to less than 2 inches it means that you did not give the group enough area. Increase your allocation by about 25% and try again. If on the other hand, there is spotty grazing and waste with considerable grass ungrazed after 24 hours, you gave the group too much area. Decrease the allotment by 25 to 50% and check again. In a few days you will be very close to the correct allotment. At this point, the allocation can be changed to accommodate the management style of the grazer; that is a 2 or 3 day allocation can be made instead of daily moves. It should be noted, however, that once the allocation is increased beyond about 3 days, increased waste and reduced utilization can be expected. Strip grazing a one day allocation of grass will allow utilization of about 70 to 80% of the grass on offer. Allocating grass for longer periods (a week or more) will reduce utilization to 50% or less.

Summary- In summary, stockpiling fescue for deferred fall/winter grazing is an important practice that can reduce winter feeding costs and result in well fed animals and well managed pastures.
Several articles that the VT Extension Beef Team has written over the last few months indicated that one way to stretch hay supplies was to feed grain/by-products and limit feed hay. Since those articles appeared, many folks asked for methods to decrease or limit hay intake.

**How much is enough?**
Long stem hay is important for healthy rumen function. There must be sufficient “scratch factor” to stimulate rumen motility and salivation. Rumen motility is important for proper mixing of feed with rumen microbes to enhance digestion. Salivation is critical to maintaining the rumen at the correct pH. A minimum of 5 lbs of hay per cow per day is needed to maintain rumen function.

**Methods to control intake**
Back when we all fed small square bales limiting intake was rather easy. Knowing the weight of the bales (usually 40 to 60 lbs), we simply decided how many cows per bale and put out the correct number. With large bales (round or square), the job of limiting hay intake becomes more difficult. The first step is to know how much the bales you make weigh. Your baler salesman is a nice guy, but the figure he gives you on bale weight is usually the maximum. Weigh a few bales on a cattle scale or take a load to the truck scale and weigh them.

*Bale busters or bale unrollers.* These machines can deliver precise or controlled amounts of hay to cattle. However, they are expensive and cost prohibitive for all but the largest operations.

*Unrolling.* This method is the second most precise method we have to limit hay. This sounds simple, especially if you have a hydraulic bale mover; just take the amount of hay you want to put out and divide it by the bale weight right? Wrong. Let’s do a little geometry review. In a 5 ft. diameter bale, 1/3 of the hay is in the outer 4 inches and 1/2 of the hay in the bale is in the outer eight inches. For a 6 ft. diameter bale, 1/3 of the hay is in the outer 6 inches and 1/2 of the hay is in the outer 12 inches.

For example, you have a 5x5 bale that weighs 1000 lbs. and you have 50 cows. You want to feed those cows 10 lbs of hay each, so you need to feed 1/2 of the bale. On the first day, you roll out the outer 8 inches of the bale. On the second day, you roll out the rest of the bale.

Wastage is still a factor with unrolling. Cows and calves will trample and soil about 5 to 10% of the hay rolled out. In high wind conditions, you may be feeding the neighbor’s cows instead of your own. Losses due to waste are increased in wet or snowy conditions.

*Limiting access.* This method is extremely effective especially for smaller herds of <50 cows. Cows are allowed access to hay for only a few hours per day then they are moved to an adjacent area or pasture. Temporary electric fence can be used if kept adequately charged.

Recent research from the University of Illinois (Miller et al., 2007) indicates that as little as 3 hours of access is needed with high quality hay, and 6 to 9 hours of access is needed for medium quality hays to achieve cow performance similar to 24 hour access. In this particular research, hay was the only feed offered these gestating cows. If hay is to be stretched by feeding by-products then 3 to 4 hours of access may be sufficient. It is important that there are enough feeding locations so all cows can eat at the same time. Therefore, multiple hay bale feeders may be needed. However, with today’s hay prices you can pay for a couple of new round bale feeders very quickly.
**Limiting Hay Intake by Cows**

Continued from page 4

*Two on - One off.* This is a very simple method that does not save as much hay as other methods, but most producers can achieve some reduction in hay usage this way. Cows are fed all the hay they want for two days and then hay feeding is skipped on the third day. Cows should be fed the supplement portion of their diet on the day hay feeding is skipped. Cow performance will not be compromised by skipping a day of hay feeding if supplements such as corn gluten feed are fed. Cows will have sufficient rumen fill to continue to have cud to chew and produce extra heat from fermentation on the day without hay. It takes 48 to 72 hours for the rumen to empty if cattle receive no feed.

**Adapting to conditions**

It is critical that with all of these methods consideration is given for weather conditions. If a week of extremely cold weather is predicted then limiting hay intake may not be the best idea. During these extreme periods, using more hay will provide addition nutrition needed by the cattle. In addition, cow body condition should be monitored throughout the winter, and feeding practices adjusted to maintain a body condition score of 5 to 6.


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**Prussic Acid Poisoning**

*By Jim Green*

Prussic acid poisoning of grazing animals is a potential for plants like Sudan grass, sorghum-Sudan grass or Johnson grass after the first killing frost. There are always questions about the definition of a "killing frost", and as a rule the temperature has to get below about 26 to 28 °F to actually freeze the cell contents of the leaf tissue. Therefore it is suggested that one be cautious about grazing these plants anytime the temperatures drop below 32 °F. Often scattered frost in an area causes enough concern that it is best to keep animals out of pastures until the leaves begin to turn yellow or light brown. The danger of toxicity is actually only during the first 72 hours after the plant cells are frozen, but most people want to error on the safe side and wait until the plants show definite signs of drying.

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**Annual Ryegrass for Winter Pasture**

*by Dr. Jim Green, NCSU*

Annual Ryegrass (Lolium multiflorum Lam.) is not the same as rye (Secale cereale L.), which is a large seeded small grain. Both are winter annuals that can provide high quality forage under good management. Annual ryegrass yields more forage than cereal rye a given year. While ryegrass grows more actively than rye from late April through May, rye is more productive than ryegrass from December to February.

Tetraploid ryegrasses usually have broader leaves than the Diploid varieties, but otherwise have little other advantages. Dr. Nelson suggested that the tetraploid cultivars may not be worth a premium cost over the diploid varieties.

There are several varieties that meet the needs of most farmers. Suggest that farmers use more than one variety if they are planting several acres; this can help spread some of the risks and extend production through varying maturity.

Seeding rates: 20 to 30 lbs/acre in drilled rows and 30 to 40 when broadcast on surface. Stands will be ready to graze 3 to 6 weeks sooner when seed is planted into a prepared seedbed compared to not till planting into sod depending on moisture and existing competition.
Forage crops remove nutrients from the soil just as row crops. If the field is cut for hay and the hay transported elsewhere, then those nutrients are indeed removed. Table 1 presents some general uptake values by our most common forage species.

### Table 1. Approximate pounds of nutrients removed by various forage crops at specified yield levels when harvested as hay.\(^1\)

<table>
<thead>
<tr>
<th>Species and assumed hay yield in tons per acre</th>
<th>Tall fescue</th>
<th>Bermudagrass</th>
<th>Sorghum-Sudan</th>
<th>Alfalfa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen (N)</td>
<td>135</td>
<td>258</td>
<td>160</td>
<td>280</td>
</tr>
<tr>
<td>Phosphate (P(_2)O(_5))</td>
<td>65</td>
<td>60</td>
<td>61</td>
<td>75</td>
</tr>
<tr>
<td>Potash (K(_2)O)</td>
<td>185</td>
<td>288</td>
<td>233</td>
<td>300</td>
</tr>
<tr>
<td>Magnesium (Mg)</td>
<td>13</td>
<td>18</td>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td>Sulfur (S)</td>
<td>14</td>
<td>30</td>
<td>--</td>
<td>25</td>
</tr>
</tbody>
</table>

\(^1\) Source: Potash & Phosphate Institute

These figures provide a fair estimate of the fertilizer requirements of these forage crops. These values are an under-estimate of actual fertilizer recommendations due to environmental loss and tie-up of added fertilizers. Of course, the nitrogen removed by alfalfa is fixed from the air but alfalfa will still remove the other nutrients from the soil.

If the hay is fed on the farm or on a unit where it was produced, then some of "dedicated" hay fields. Hay feeding practices can help to recycle nutrients more uniformly although it may not be reasonable in some operations.

The situation is quite different in a grazed pasture. Grazing livestock recycle 80 to 90% of the nutrients they consume or remove from pastures in their manure and urine. Proper grazing management can assist greatly in redistributing the nutrients more uniformly across the pasture. Large pastures and continuous grazing will definitely result in nutrient movement and concentration. Nutrients will be concentrated at watering points, salt and mineral feeders, and especially under trees where the animals lounge.

A cow, assumed to be that mythical 1000 lb. brood cow, really accounts for no net loss of nutrients from a farm until she is sold. Actually, as shown in Table 2, she does not account for much of the nutrient uptake by forages, although she processes many 100's of pounds of nutrients in her productive life time. The net loss of nutrients in a beef production operation is in the product that is sold; i.e., the calf/steer/heifer. A look at Table 2 shows that very little is removed when the calf is sold.

### Table 2. Approximate amount of nutrients contained in the bodies of two classes of livestock, in pounds.\(^1\)

<table>
<thead>
<tr>
<th></th>
<th>Mature cow</th>
<th>500 lb Calf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>26</td>
<td>13</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>7</td>
<td>3.3</td>
</tr>
<tr>
<td>Potassium</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Calcium</td>
<td>15</td>
<td>7</td>
</tr>
</tbody>
</table>

\(^1\) Calculations are approximations based on several references of bodily percent composition.
Nutrient Uptake and “Removal” by Forages (continued)

If the nutrients being consumed by grazing livestock are not really being removed from the farm in "product", then we have to assume that they are either lost in another fashion or are poorly distributed around the farm. Typically losses are not that great, which leads us to the conclusion that good grazing management can have a direct influence on the amount of fertilizer needed in pasture systems by increasing the uniformity of nutrient distribution in manure and urine.

http://hubcap.clemson.edu/~blpprt/pasture/uptake.html

September-October Management Calendar

- Fertilize and lime cool season grasses.
- Keep the grazing pressure on the summer grasses and completely use them before grazing cool season forages.
- Watch for fall insects (armyworm) on established and seedling stands of forages.
- Plant winter annuals on prepared seedbed for earliest fall grazing.
- Overseed winter annuals onto summer perennials after they have been closely grazed. Planting early will require that herbicides be used to suppress the existing grass growth.
- Overseed legumes into properly fertilized and grazed pure grass pastures.
- Make a winter feed supply inventory so deficiencies can be avoided now (by purchasing hay or planting more winter pasture).
- Sample soils to be overseeded or planted next spring, so the limestone can be applied early enough to react.

I dedicate this publication to my wife, Cheryl McGee.