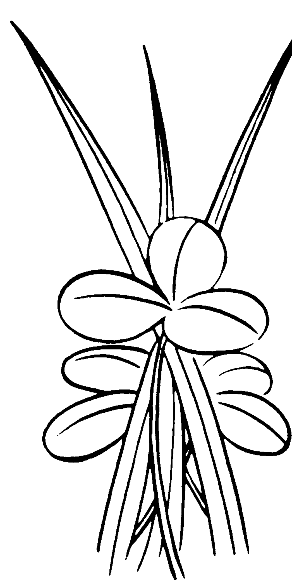
# 12th Kentucky Grazing Conference



**October 13, 2011**

**Western Kentucky University Expo Center**
**Bowling Green, Kentucky**

**Sponsored by:**
**Kentucky Forage & Grassland Council**
**University of Kentucky**

***Special Publication KFGC-11-04***

*Garry Lacefield and Christi Forsythe, Editors*

# SCHEDULE FOR THE DAY

8:45 Welcome

9:00 Benefits of Grazing: More Important Now than Ever
*Garry Lacefield*

9:15 RyzUp Smartgrass: Growth Promotion for Forages
*Ray Smith*

9:30 Stockpiling Tall Fescue: Cost & Return
*Greg Halich*

10:00 Options for Getting Water in every Paddock
*Kevin Laurent*

10:30 Break

11:00 My Grazing Experience: Reflections & Observations
*Russell Hackley*

11:30 Taking "Grazing" to the next Level
*Ed Ballard*

12:00 Lunch, KFGC Business Meeting and Awards

1:30 KFGC Forage Spokesman Contest

2:45 Forage Bowl Competition – State Payoff

3:45 Adjourn

# KFGC Award Winners History

| Year | Grassroots | Public Service: County | Public Service: State | Industry |
|---|---|---|---|---|
| 2011 | Buddy Smith | Lyndall Harned | Gene Olson | Scott Cooper |
| 2010 | Jim Landis | Tommy Yankey | Laurie Lawrence | Jon Doran |
| 2009 | Clayton & Christopher Geralds | Darrell Simpson | Glen Aiken | Jeremy McGill |
| 2008 | Todd Clark | Chris Milam | Ray Smith | Jeff Medlin |
| 2007 | John & Randy Seymour | Rick Greenwell | Lowell bush | Ralph Quillin |
| 2006 | Bill Payne | George Kelley | Mike Barrett | Buddy Rowlett |
| 2005 | Paul Beauchamp<br>Ova Alexander | Rankin Powell | Byron Sleugh | Bred Winsett |
| 2004 | Lee Robey | Don Sorrell | Donnie Davis | Joe Stephens |
| 2003 | Jason Sandefur | Keenan Turner | Tim Phillips | Mike Feldhaus |
| 2002 | Jimmy May | Doug Shepherd | Chuck Dougherty | Charlie Leppert |
| 2001 | Steve Johnson | Charlie McIntire | Donna Amaral-Phillips | Sharon Burton |
| 2000 | Nicky Baker | Gary Tilghman | Oran Little | Phil Rowland |
| 1999 | Russell Hackley | Bill Green | Joe Wyles | John Long |
| 1998 | Minos Cox | Dr. Luther Smith | Billy Ray Smith | Bill Cisney |
| 1997 | Cecil Cade | Terry Gibson<br>Darrell Burks | David Stipes | J.W. Stephens |
| 1996 | Bryan Hatfield | John Fourqurean | Jimmy C. Henning | Phil Howell |
| 1995 | Donnie Shaw | Steve Moore | John Johns | Tim Keene |
| 1994 (Nov) | J.B. & Bill Holtzclaw | Steve Osborne<br>Ken Johnson | David Williamson | Bill Talley |
| 1994 (Jan) | Ben Crawford | Jack Ewing | Mike Collins | Gary Coughlin |
| 1993 | Larry Shirley | Paul Deaton | Roy Burris | Gary Lane |
| 1992 | Larry Jeffries | Tom Curtsinger | Harold Vaught | Dink Embry |
| 1991 | John Nowak | Dan Grigson | Ken Wells | Tim Sickman |
| 1990 | Wallace Campbell | Kelsey Driskill | Don Henry | Charles Dobbs |
| 1989 | None | None | None | None |
| 1988 | None | None | Normal Taylor | Henry T. McCarley |
| 1987 | Hillary Skees | John Kavanaugh<br>(1st year awarded) | Paul Burris | Wayne Harr |
| 1986 | Don Moore | | Curtis Absher | Garland Bastin |
| 1985 | Lenn Lee Nelson<br>Dr. G.L. Simpson | | Monroe Rasnake | |
| 1984 | Paul McCarthy | | A.J. Hiatt | Jack Crowner |
| 1983 | Dale Lovell | | Bobby Pass | |
| 1982 | Larry Campbell | | | |
| 1981 | Harry Goodin<br>Henry Besuden | | Garry Lacefield<br>J. Kenneth Evans | Aubrey Warren |
| 1980 | Charles Schnitzler<br>Harold Rose<br>John Turner<br>Don Evans | | Tim Taylor | Warren Thompson |
| 1979 | | | | |
| 1978 | | | | |
| 1977 | | | | |
| 1976 | | | E.N. Fergus<br>Bill Johnstone | Barney Arnold |

# F O R E W O R D

This marks the 12th consecutive year we have come together to spend the day discussing "Practical Grazing Issues". I am delighted to have the support, encouragement and assistance for this years' conference. The program committee has assembled a great group of speakers covering a wide array of timely-practical topics relating to grazing in Kentucky.

I want to extend a special THANKS to all speakers and exhibitors. Special thanks to Christi Forsythe for handling all the details concerning program and proceedings.

Special thanks are extended to Dr. Jack Rudolph, Dr. Linda Gonzales, Mr. Tim Jones and all the faculty, staff and students at Western Kentucky University.

I do hope the discussions of the day will be of value to you and your grazing program.

Garry D. Lacefield
Program Chairman

# TABLE OF CONTENTS

# BENEFITS OF "IMPROVED" GRAZING – MORE IMPORTANT NOW THAN EVER!

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At this Conference twelve years ago I talked about the "Benefits of Improved Grazing". We have had aspects of that theme at every Kentucky Grazing Conference since and also emphasized that message at 10 Heart of America Grazing Conferences and three National Grazing Conferences. With all that emphasis, why do I bring this up again and even have the nerve to say "More Important Now than Ever"? Well, the short answer is "things are different now!"

Things have changed and yes, things are very different relative to grazing now than they were when we started this conference. Some examples include: an increased interest and demand for grass-fed, forage-fed, pasture-based organic, natural, and other popular terms pertaining to more nutrients from "grazing" and less from concentrates and stored feed; greater environmental regulations that favor pasture-based animal production; more positive attitudes toward pasture-based animal products; and, of course, "economics".

Another major driving force in this movement has been input costs. You know this much better than I but a few examples are in order. Corn prices have increased 228%, diesel has increased 159%, and nitrogen fertilizer has increased 165% over the last decade and you can add your own increase in almost all input costs. All of these and other factors lead to the reality of this presentation "Benefits of Improved Grazing: MORE IMPORTANT NOW THAN EVER".

Grazing represents the cheapest way to feed ruminants on a cost per pound of nutrient basis. Stored feed is usually the single largest item in livestock budgets and cost or amount of stored feed is usually the best prediction of potential profitability in most beef cattle operations.

Controlled grazing, intensive grazing, management intensive grazing, rotational grazing, and intensive rotational grazing are only a few of the terms frequently used by grazing enthusiasts. Rotational grazing can help farmers to directly affect net profit by: increasing animal products per acre, reducing cost of machinery, fuel, facilities, etc., reducing supplemental feeding, reduce wasted pasture, improving the monthly distribution and yield of pasture, improving distribution and use of animal waste and fertilizer, improving botanical composition of pasture, minimizing the daily fluctuations in intake and quality feed and more efficiently allocate pasture to animals based on quality needs. Let's review some potential benefits of "improving" our overall grazing program.

**UTILIZATION** - Grazing methods dictate how much of the overall pasture produced is actually utilized by the grazing animal. In order to better understand this aspect, let's first examine the difference between "seasonal and temporal utilization". Temporal utilization is defined as how much of the existing pasture we utilize during a grazing period and "seasonal" is the amount of the pasture utilized over the grazing season. In a continuous grazing program, these two are the same and can help explain why most continuous grazing programs only utilize a small amount of the total pasture produced for the season (Table 1). With rotational grazing or other grazing methods, we can improve our utilization, thus wasting less (Table 2).

**Table 1. Amount of forage utilized with different grazing methods.**

| Method | % Utilization* |
|---|---|
| Greenchop | 85 - 95 |
| Haylage | 80 - 95 |
| Hay | 70 - 85 |
| Strip grazing | 70 - 85 |
| Rotation two times/day | 70 - 80 |
| Daily rotation | 60 - 75 |
| Rotation every two days | 55 - 70 |
| Three to seven day rotation | 50 - 70 |
| Three to five week rotation | 40 - 60 |
| Continuous grazing | 20 - 50 |

*These values should only be used as a guide. Considerable variation can exist within and among categories.

**Table 2. Increase in gain per acre with rotational compared to continuous grazing.**

| State | % Increase |
|---|---|
| Arkansas | 44 |
| Georgia | 37 |
| Oklahoma | 35 |

**YIELD** - Pasture plants grow at different rates throughout the growing season. Cool-season grasses grow best in spring, good in late-summer-fall, and little during summer and winter (Figure 1). Amount of growth during each period is dependent on temperature and moisture. With continuous grazing, it is difficult to keep pasture plants in their most efficient photosynthetic growth stage. Some plants are often overgrazed while others are not grazed and become mature. This is especially a problem during

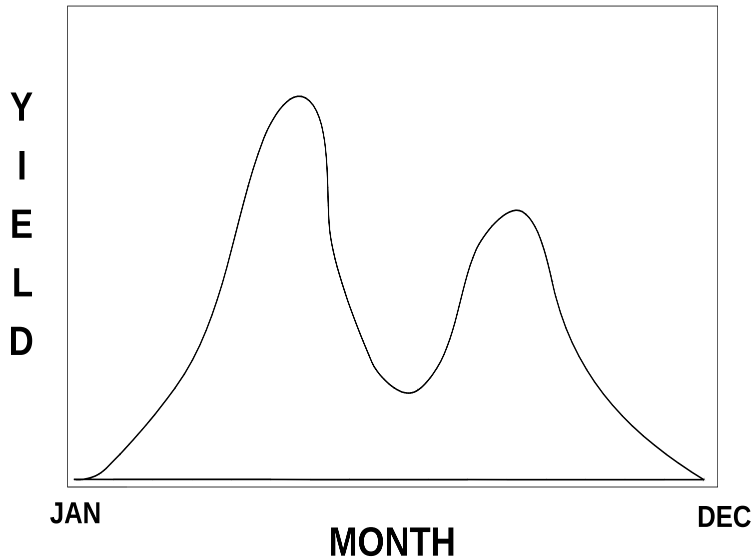


**Figure 1. Growth patterns of cool-season grasses.**

spring surplus. With rotational grazing, we can keep plants at a more efficient stage that can result in more animal product per acre (Table 3). During spring surplus, we can harvest selected paddocks for hay or haylage.

**Table 3. Increase in production from alfalfa-orchardgrass with rotational and continuous grazing.**

| | **% Increase over continuous** |
|---|---|
| Carrying capacity | 43 |
| Milk production | 40 |

SOURCE: VPI Bull. #45

**QUALITY** - Forage quality is highest when pasture plants are young and vegetative. Pasture quality is very closely coordinated with amount of leaves. With rotational grazing, we can usually manage “leaf” content and ultimately quality better than using most continuous methods (Table 4). In addition, quality for many cool season based pastures is usually associated with legume content. With various rotational grazing methods, we can usually manage our legumes and keep them more productive and persistent than under continuous grazing methods.

**Table 4. Percent leaves and persistence with different grazing methods.**

| | Grazing Method | |
|---|---|---|
| | **Rotational** | **Continuous** |
| Percent leaves | 46 - 49 | 31 - 36 |
| Percent stand (3rd yr) | 84 | 62 |

Mathews et.al. Univ. of Florida. 1994.

The yield quality relationship can be better explained by examining the gain per acre (yield) and gain per animal (quality) relationship (Figure 2).

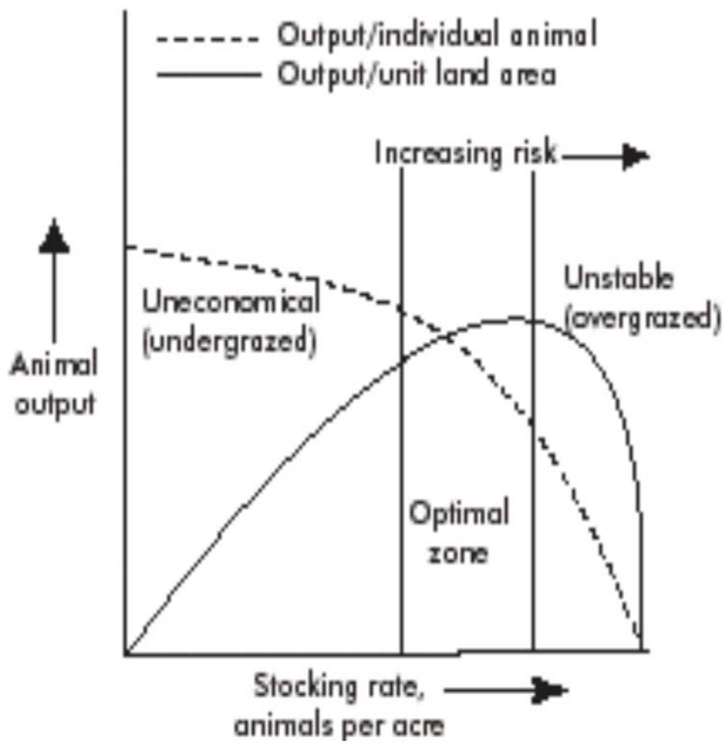


**Figure 2. Relationship of Gain Per Acre and Gain Per Animal.**

As stocking rate is increased less forage is available per animal. Individual animal output decreases as animals compete for forage and have less opportunity to select green, leafy forage. As a result of increased forage utilization, animal output per acre increases with stocking rate until individual animal gains are depressed to the point that the additional animals carried do not compensate for the loss. At high stocking rates, photosynthetic is reduced due to insufficient leaf area, plants are weakened, and forage growth is depressed.

**EXTEND THE GRAZING SEASON** - When improved grazing methods are used, forage utilization usually increases and “waste” decreased. With decreased waste, more pasture is available for grazing over a larger period of time. Missouri workers used a strip-grazing approach to utilize stockpiled tall fescue. When a three day pasture supply was compared to a fourteen day supply they increased cow-days per acre by 32 with a 56% increase in carrying capacity. Farmers repeatedly tell me that during drought conditions, rotational grazing methods results in more pasture over a longer period of time compared to continuous grazing.

**STAND PERSISTENCE** - Many pasture plants can be grazed continuously and continue to persist. Examples include Kentucky bluegrass, bermudagrass, endophyte infected tall fescue and white clover. Other plants will not persist for long when continuously overgrazed. Examples include alfalfa, most warm season perennial grasses, and warm season annuals. Even the plants capable of withstanding continuous grazing will usually be more productive under some grazing method that permits time for rest and regrowth.

**ANIMAL PERFORMANCE** - As we noted when discussing Figure 2 “Relationship between gains per acre and gains per animal,” stocking rates are critical in determining yield of both plant and animal. One study conducted by a close friend and highly respected forage scientist illustrates what I believe is the potential improvement when comparing “rotational and continuous grazing systems” (Table 5).

**Table 5. Gain per acre, gain per animal, and hay required for wintering a beef cow using different grazing methods.**

| | **Percent change of rotational over continuous grazing** |
|---|---|
| Stocking rate | +38 |
| Calf gain/acre | +37 |
| Hay fed/cow | -32 |

SOURCE: Dr. Carl Hoveland, Univ. of Georgia.

**ANIMAL HEALTH** - I wish I had several years of research data to make a strong statement about improved animal health with improved grazing method. Unfortunately, I am not aware of many studies in this area. Farmers tell me and common sense suggests that if you are using a system that requires you to move animals on some schedule, you have a chance to observe more frequently for any herd health problems. Controlling problems before they get serious is a health benefit for the animal and an economic benefit for the owner.

**ENVIRONMENTAL** - Improving grazing systems can have a positive impact on various environmental issues, especially "water". Most improved grazing systems involve reducing pasture size, more water points, and often fencing animals out of ponds and streams or designing limited access. Each system that keeps animal manure and urine out of the water supply can have a potential environmental benefit.

Another issue involves manure and urine distribution. Approximately 75-85% of nutrients consumed by grazing animals are returned through animal manure and urine. With large pastures grazed continuously, much of the manure and urine is deposited near the water source and shade. Research has shown that other grazing methods can results in better distribution.

**ECONOMICS** - Making more money by changing your grazing system is not automatic. Just putting more fences and water in may just cost your money and time if it doesn't fit into the overall plant-animal-environment system. Improving your grazing system certainly offers many opportunities and indeed the opportunity to improve our bottom line; however, I again caution that we need the "system" that consists of adequate fertility, matching plant species and varieties, managing plant pest problems, matching pasture quality to animal needs, having good quality-healthy animals that can make best use of pasture available, and an overall plan to optimize grazing and minimize stored feed required.

With all of the above as "cautions", let me now tell you what I believe about improved grazing and its opportunity for producers. I believe that our greatest opportunity for "IMPROVEMENT" rests squarely under the "Grazing" umbrella. I know of no other principle or practice that I feel offers livestock producers more potential. Again, I wish I had ten years of data that would document my belief; however, I do not. I do want to share some data from Pennsylvania (Table 6) that shows what farmers have observed using four different forage harvesting and utilization systems. In these studies, rotational grazing returned more profit per acre than continuous grazing, hay or corn silage. Missouri workers, Table 7, showed a drastic reduction in wintering cost per cow using various grazing options. Days of "hay feeding" were reduced by over 65% with different grazing options.

| Table 6. Enterprise budgets for pasture and forage crops. | | | | |
|---|---|---|---|---|
| | **Intensive pasture** | **Continuous pasture** | **Hay** | **Corn silage** |
| | **------------------ per acre ------------------** | | | |
| Profit | $129 | $75 | $20 | $58 |

SOURCE: Farmer Profitability with Intensive Grazing. L. Cunningham and G. Hanson. Penn. State Univ. 1995.

**Table 7. Daily and seasonal forage costs for alternative wintering strategies at typical yields, costs, and period of use based on 100-cow herd.**

| Winter feeding period from Dec 1 to April 10 | | | | |
|---|---|---|---|---|
| **Forage Source** | **Hay** | **Cornstalks** | **Stockpiled tall fescue** | **Ryegrass + cereal rye** |
| $/cow/day | $1.32 | $0.05 | $0.31 | $0.61 |
| Days of use | 130 hay | 60 stalks | 90 graze | 90 graze |
| | | 70 hay | 40 hay | 40 hay |
| Wintering cost | $172 | $95 | $70 | $108 |

SOURCE: Jim Gerrish, University of Missouri.

A grazing method is a tool that allows producers to efficiently harvest the forage with livestock and maintain the pasture in a productive state. Several methods can be used and each method requires management control to be most successful. This involves variable stocking rates that may be achieved by altering animal number per acre, altering the size of the land area to a fixed number of animals, harvesting surplus forage for hay, haylage, or round bale silage, and/or mowing excess growth and weeds.

## SELECTED REFERENCES

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Stockpiling for Fall and Winter Pasture. 1999. G.D. Lacefield, J. Henning, J. Johns, and R. Burris. U.K. Coop. Ext. Serv. AGR-162.

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# RyzUp Smartgrass: Growth Promotion for Forages

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Whenever we discuss grazing management we emphasize how proper grazing will produce the maximum amount of plant growth. Giving forage plants an adequate rest period after each grazing event is essential to allow growth and storage of carbohydrates for the next growth cycle. With grasses, leaving leaf area after grazing allows the plant to maintain photosynthesis and regrow faster. On a more basic level though, all plants regulate growth with hormones. These hormones are termed “plant growth regulators.” Auxin controls cell division and the direction of plant growth. Gibberellic acid (abbrev. GA) has three main functions in plants: 1) stimulate rapid stem and root growth, 2) induce mitotic division in the leaves of some plants, and 3) increase seed germination rate. Since the 1950’s researchers have been exploring how to use plant growth regulators commercially. In other words, can spraying additional amounts of natural hormones onto plants stimulate more growth resulting in higher yields or onto seeds to improve germination and initial root growth.

The plant hormone that has been used the most successfully commercially is gibberellic acid. It is sometimes used trigger germination in seeds that would otherwise remain dormant. It is also widely used in the grape-growing industry as a hormone to induce the production of larger bundles and bigger grapes, especially Thompson seedless grapes. It is used to increase fruit size and market value of cherries, blueberries, and a number of other fruits and vegetables. Starting about 10 years ago Valent BioSciences developed a formulation of gibberellic acid to stimulate grass growth. This product has been sold in Australia and New Zealand for several years under the name “ProGibb Smartgrass.” Forage producers there use it to stimulate perennial ryegrass growth during cooler months of the year when the grass is otherwise dormant or slow growing. This same formulation is now being sold in the U.S. under the tradename “RyzUp Smartgrass.” It even has an organic certification since it is a natural plant hormone. The important question in KY and surrounding states is, “Will RyzUp Smartgrass stimulate grass growth enough in KY to make it economically viable for forage producers?”

Research trials have been conducted in a number of states including KY, PN, MI, GA and others. We have worked with about 10 county agents in KY to establish demonstration strips in existing pastures and hayfields over the last three years. Results have been mixed in that in some producer fields we have seen improved yields and in other fields we have seen little difference in forage production. During this presentation I will overview RyzUp Smartgrass research trials around the country and each of the demonstration projects in KY. I will discuss the potential application of this product for forage producers in the state including timing, application rate, and grazing or harvest period.

# Stockpiling Tall Fescue: Cost & Return

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**Introduction**:

An opportunity that Kentucky cattle farmers have in reducing their hay requirements is to apply nitrogen on select pastures to stockpile for fall and winter grazing. By increasing the total pasture production during this time period, the grazing season can be extended and the amount of hay required can be reduced.

While this concept is pretty straightforward, the challenge each year is to determine the likelihood that this practice will be profitable given the economic and agronomic conditions present at mid-summer. While there can be significant benefits from this practice, there are also significant costs. These benefits/costs must be quantified and compared in order to assess the overall profitability of the practice. The model used in this analysis has the ability to quantify and the costs and benefits, and to make adjustments each year to match current conditions.

**Agronomic Basics for Stockpiling Pastures**:

Stockpiling late summer pastures in Kentucky typically means applying nitrogen (N) to tall fescue pastures in August, letting them grow through the fall, and then grazing during the late fall and early winter. The best pastures to target are those with the thickest stands of fescue. Fescue responds extremely well to N applications in late summer and has an amazing ability to retain its nutrient value through the winter. Targeted pastures should have low concentrations of weeds and low amounts of clover since legumes do not stockpile well after frost and the yield benefit of added N is less than in pure fescue stands. Moreover, N has the potential to reduce the clover component of the sward as the additional fescue growth will compete with the legumes. A good rule of thumb is that where clover makes up more than 20% of the stand, the short-term yield increase from nitrogen will not typically outweigh the long-term forage quality and nitrogen fixation benefit of the lost clover.

Pastures should be grazed or mowed to reduce fescue height to 2 to 3 inches during early to mid-August. Grazing or mowing removes low quality summer growth and allows the plant to produce high quality leaves. With adequate soil moisture, a considerable amount of growth will occur within four to six weeks, but waiting 8 to 12 weeks before grazing is preferable.

The optimal time to apply N is in early to mid-August. Prior applications may encourage the growth of weedy grasses like crabgrass. Waiting until September will reduce the efficiency of N conversion into plant growth. For example, one Kentucky study showed that N conversion efficiency (lbs dry matter fescue growth per unit N) was 27:1 on Aug 1, 26:1 on Aug 15, 19:1 on Sept 1, and 11:1 on Oct 1. N response efficiency also depends on soil moisture. Without rain and/or adequate soil moisture, N response will be low, but even with small amounts of rain tall fescue has an amazing potential for fall growth.

Traditional "stockpiling" involves keeping cattle off the pasture until late fall, but this practice may be difficult when pasture production is low. If forage is needed, N fertilized pastures can be grazed in the early fall, but it is recommended that cattle be kept off these pastures for at least a month. An alternative strategy is to feed hay during the stockpiling period to supplement the pastures that cattle are on.

There are several forms of N available for pasture use, but the two main types are ammonium nitrate and urea. Ammonium nitrate is an excellent form to use in late summer because it is not subject to surface volatilization. However, ammonium nitrate is becoming increasingly difficult to purchase due to Homeland Security measures. Urea is generally a cheaper source of N, but a significant amount of N can be completely lost under hot, humid, and dry soil conditions favoring volatilization. Typical urea losses in late summer range from 15-30%, but can approach 40-50% when there is no rainfall for several weeks after application. Fortunately, urease inhibitors (e.g. Agrotain) have been recently developed to reduce volatilization losses with urea (see AGR-185 at http://www.ca.uky.edu/agc/pubs/agr/agr185/agr185.pdf). Even though they add to the overall cost, urease inhibitors are recommended in the summer for urea due to the unpredictable rainfall in August. The most effective urease inhibitors will typically prevent volatilization for two weeks without rain, compared to pure urea where volatilization begins immediately after application. Be aware that all urease inhibitors are not equally effective.

Besides the application of N, it is important that stockpiled fields be limed and fertilized with P and K to acceptable levels (see AGR-1 at http://www.ca.uky.edu/agc/pubs/agr/agr1/agr1.pdf).

Where possible, stockpiled tall fescue fields should be strip grazed and stocked heavily enough to graze down each paddock in 7 to 10 days or less. This allows the forage to be efficiently utilized without excessive trampling and waste. Since tall fescue does not re-grow in the winter, a back fence is not needed when strip grazing stockpiled growth.

Greater detail of the stockpiling process can be found in the UK extension publication AGR-162 "Stockpiling for Fall and Winter Pasture" which can be found at: http://www.ca.uky.edu/agc/pubs/agr/agr162/agr162.pdf

Agronomic Summary:

1. Mow or graze pasture early to mid August.
2. Remove cattle from pasture.
3. Apply 30-80 units N per acre.
4. Allow pasture to grow into late fall.
5. Strip graze if practical.

## **Potential Savings from Applying Nitrogen to Tall Fescue Pastures:**

The analysis used here accounts for the major factors that impact the profitability of nitrogen applications to late summer tall fescue pastures, and includes the price of nitrogen, price of hay, response rate of nitrogen, labor costs of feeding hay and stockpiled fescue, waste rates, nutrient recycling of hay, and forage quality. For example, as the price of N increases, profitability of the practice will decrease. As the price of hay increases, profitability will increase. As soil moisture conditions improve, profitability will increase. This analysis determines the changes in net revenue from late summer nitrogen applications of 40 and 80 units (120 lbs and 240 lbs of ammonium nitrate respectively) compared to the no application situation. Changes in profitability are based on a 30-cow, spring-calving herd.

Two of the most important factors in this analysis are the price of nitrogen and the price of hay. The price of nitrogen was evaluated on an elemental (lbs actual N) or unit basis[1] in 2011 between $.65-.85 per unit[2] which were representative of prices in mid-July. For urea, you need to multiply the actual price by 1.2-1.4 to get an effective price (or use a lower response rate). Hay values were evaluated on a per ton basis between $40-70. These values should capture most of the variability in market conditions that is likely to occur this year. Multiple scenarios are evaluated and you need to use their best judgment for anticipated price(s) including those outside the range presented here.

The application cost for spreading the nitrogen was set at $5/acre. Waste rates for both grazing and hay feeding (the latter includes both losses from weathering and feeding) were set at 35%. Machinery and labor costs were set to be representative of the average Kentucky cow-calf operation in both size (30 cow herd) and management intensity. This resulted in a labor cost of $.06 per cow day for grazing[3], and machinery and labor cost of $.25 per cow day for hay feeding. Feeding hay results in imported

[1] To convert elemental N to urea: Multiply elemental value by 2.17. E.G. 100 units N = 100x2.17 = 217 lbs urea. To convert elemental N to ammonium nitrate: Multiply elemental value by 2.99. E.G. 100 units N = 100x2.99 = 299 lbs ammonium nitrate.

[2] $.65/unit N = $435/ton AmmNit and $600/ton Urea; $.75/unit N = $500/ton AmmNit and $690/ton Urea; $.85/unit N = $570/ton AmmNit and $780/ton Urea.

[3] Assumes open-access to stockpiled pasture (not “strip grazed”).

nutrients being deposited in pastures. It is assumed that 50% of the P and K from feeding hay are effectively recycled into the soil at $.57/lb for $P_2O_5$ and $.52/lb for $K_2O$.

Three nitrogen response rates were used in the analysis: low, medium, and high. Consult Table 2 to determine which nitrogen response curve is most appropriate for your specific condition. *The choice of response rate is probably the single most important determinant in the analysis*. These response rates are based on a four-year Missouri study. The high response rate used in the model was actually the average of the four years from this study that included both wet and dry years. However, the study site was on deep, fertile soil and would be representative of the best soil types in Kentucky. Thus adjustments needed to be made from this base response rate depending on the soil quality and the specific soil moisture conditions present. University of Kentucky agronomists (Drs. Lloyd Murdock and Ray Smith) adjusted the response functions for various combinations of soil quality and moisture conditions (see Table 2).

In addition to the response rates, the model also separately evaluates pastures that are predominantly fescue, and stands that are a fescue-clover mix. "Fescue-clover" stands in the Missouri study had an average of 20-30% clover (mostly red). "Fescue" stands were on average about 95% tall fescue. Thus if you have a fescue-clover stand that contains 10-15% clover you would probably want to average the results for the two stand types. As mentioned earlier, nitrogen has the potential to reduce the clover component of the sward, so nitrogen applications are not normally recommended where clover makes up more than 20% of the stand.

*Results (2011 Example):*

Table 1 summarizes the likely cost savings from applying 40 or 80 units of nitrogen on a per acre basis in 2011. Using the most likely price estimates for nitrogen ($.75/unit or actual lbs N for ammonium nitrate) and hay ($50/ton), applying nitrogen resulted in a net loss compared to feeding hay with a low nitrogen response rate for both pure fescue and fescue-clover stands. With a medium response rate applying nitrogen resulted in a net loss in fescue-clover stands and was about a break-even proposition in pure fescue stands. The high response rate resulted in net savings of $14-17 per acre in pure fescue stands and a net loss in fescue-clover stands for these mid-range prices. Thus the only situation (at the most likely hay and nitrogen prices) in which applying nitrogen looks to be profitable this year is in pure fescue stands that have good to excellent soil moisture conditions. Note that even where potential cost savings in the fescue-clover stands exist with the high response rate (if you assume higher hay prices and lower nitrogen prices), this needs to be balanced with the potential loss of clover due to N applications.

Use Table 2 to determine which response function is most appropriate for your soil conditions and then use Table 1 to estimate potential savings (if any) based on your estimates for hay and nitrogen prices. *Make sure to use an appropriately lower nitrogen response rating if applications are to occur after mid-August*.

If you plan to use urea (without an effective urease inhibitor) as your nitrogen source, you need to make adjustments in Table 2 to reflect volatilization losses generally experienced at this time of year. There are two ways to do this: 1) Increase the effective price of the nitrogen. An increase from $.75 to $.85/unit N will approximate a 12% volatilization loss, while an increase from $.65 to $.85/unit N will approximate a 24% volatilization loss. 2) Use a response rating one level below what you would have otherwise. This will approximate a 25% volatilization loss. In either case, you will have to adjust the nitrogen application rates upward by the expected volatilization loss (e.g. if you expect a 33% loss multiply the rate by 1.33).

If your assumptions for waste rates, labor and machinery costs, nutrient recycling rates, etc. are much different than those used here, you will want to run your specific parameter estimates through the model. Please contact me (contact information on the last page) to run custom scenarios.

*Looking Back at 2011 Estimates:*

Applying N in late summer is always somewhat of a gamble in terms of response rate. In late July, there were few areas in Kentucky that had good soil moisture conditions. Many areas in the state were already dry or quickly approaching this status. Consequently, it appeared that the probability of having a high response rate to the N applications was not very good. August continued this dry pattern and toward the end of the month it did not appear that we would get much fall growth. In early September however, most of Kentucky had a significant rain event from a hurricane aftermath and replenished soil moisture conditions. But given that the beginning of the stockpiling period was very dry (August) the medium response rate is probably the most likely response outcome.

*Estimates for Future Years:*

As mentioned earlier, the challenge each year is to determine the likelihood that this practice will be profitable given the economic and agronomic conditions present at mid-summer. From a practical standpoint, this is accomplished by using the best information given prices and soil moisture conditions in late July or early August. Each year, multiple scenarios are evaluated in late July and a summary publication disseminated so that users can choose which of these scenarios best fits their situation.

You can go to the following site to find the updated publication (usually available by the end of July): http://www.ca.uky.edu/agecon/index.php?p=169 or contact me directly at Greg.Halich@uky.edu

## Table 1 - Cost Savings of Applying Nitrogen to Late Summer Pastures Kentucky (2011)

| | | *Low Response to Nitrogen* | | | | *Medium Response to Nitrogen* | | | | *High Response to Nitrogen* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *Fescue[1]* | | *Fescue-Clover[2]* | | *Fescue[3]* | | *Fescue-Clover[4]* | | *Fescue[5]* | | *Fescue-Clover[6]* | |
| *Price Nitrogen ($/unit)* | *Price Hay ($/ton)* | 40 units N Savings ($/acre) | 80 units N Savings ($/acre) | 40 units N Savings ($/acre) | 80 units N Savings ($/acre) | 40 units N Savings ($/acre) | 80 units N Savings ($/acre) | 40 units N Savings ($/acre) | 80 units N Savings ($/acre) | 40 units N Savings ($/acre) | 80 units N Savings ($/acre) | 40 units N Savings ($/acre) | 80 units N Savings ($/acre) |
| *$0.65* | *$40* | ($11) | ($23) | ($19) | ($36) | ($2) | ($9) | ($14) | ($28) | $9 | $10 | ($8) | ($17) |
| *$0.65* | *$50* | ($6) | ($15) | ($16) | ($31) | $4 | $2 | ($10) | ($21) | $18 | $25 | ($2) | ($7) |
| *$0.65* | *$60* | ($1) | ($6) | ($13) | ($26) | $11 | $13 | ($6) | ($14) | $27 | $40 | $3 | $2 |
| *$0.65* | *$70* | $4 | $2 | ($10) | ($20) | $17 | $24 | ($2) | ($7) | $35 | $56 | $9 | $11 |
| *$0.75* | *$40* | ($15) | ($31) | ($23) | ($44) | ($6) | ($17) | ($18) | ($36) | $5 | $2 | ($12) | ($25) |
| *$0.75* | *$50* | ($10) | ($23) | ($20) | ($39) | $0 | ($6) | ($14) | ($29) | $14 | $17 | ($6) | ($15) |
| *$0.75* | *$60* | ($5) | ($14) | ($17) | ($34) | $7 | $5 | ($10) | ($22) | $23 | $32 | ($1) | ($6) |
| *$0.75* | *$70* | ($0) | ($6) | ($14) | ($28) | $13 | $16 | ($6) | ($15) | $31 | $48 | $5 | $3 |
| *$0.85* | *$40* | ($19) | ($39) | ($27) | ($52) | ($10) | ($25) | ($22) | ($44) | $1 | ($6) | ($16) | ($33) |
| *$0.85* | *$50* | ($14) | ($31) | ($24) | ($47) | ($4) | ($14) | ($18) | ($37) | $10 | $9 | ($10) | ($23) |
| *$0.85* | *$60* | ($9) | ($22) | ($21) | ($42) | $3 | ($3) | ($14) | ($30) | $19 | $24 | ($5) | ($14) |
| *$0.85* | *$70* | ($4) | ($14) | ($18) | ($36) | $9 | $8 | ($10) | ($23) | $27 | $40 | $1 | ($5) |

Note: Results are applicable for ammonium nitrate. For urea, use a lower response rating or a higher effective N cost to approximate volatilization losses.

Note: $.65/unit N = $435/ton AmmNit and $600/ton Urea; $.75/unit N = $500/ton AmmNit and $690/ton Urea; $.85/unit N = $570/ton AmmNit and $780/ton Urea.

Assumptions Cattle: Spring Calving (late pregnancy in mid-winter); 30 cow herd.

Assumptions Grazing: TDN=65%; Waste=35%; Application cost N = $5/acre; labor cost = $.06/cow/day with open access to entire pasture.

Assumptions Feeding Hay: TDN=55%; DMI=2.0% hay+grain; Waste=35%; labor and machinery cost=$.25/cow/day.

Assumptions Nutrient Value of Hay: Assumes 50% of P and K effectively recycled into pasture; $.57/lb $P_2O_5$; $.52/lb $K_2O$.

Fescue[1]: 15.5 lb avg. dry matter response per lb N (80 lb application)

Fescue-Clover[2]: 9.9 lb avg. dry matter response per lb N (80 lb application); savings need to be balanced with potential loss of clover due to N applications.

Fescue[3]: 21.1 lb avg. dry matter response per lb N (80 lb application)

Fescue-Clover[4]: 13.3 lb avg. dry matter response per lb N (80 lb application); savings need to be balanced with potential loss of clover due to N applications.

Fescue[5]: 28.8 lb avg. dry matter response per lb N (80 lb application)

Fescue-Clover[6]: 17.8 lb avg. dry matter response per lb N (80 lb application); savings need to be balanced with potential loss of clover due to N applications.

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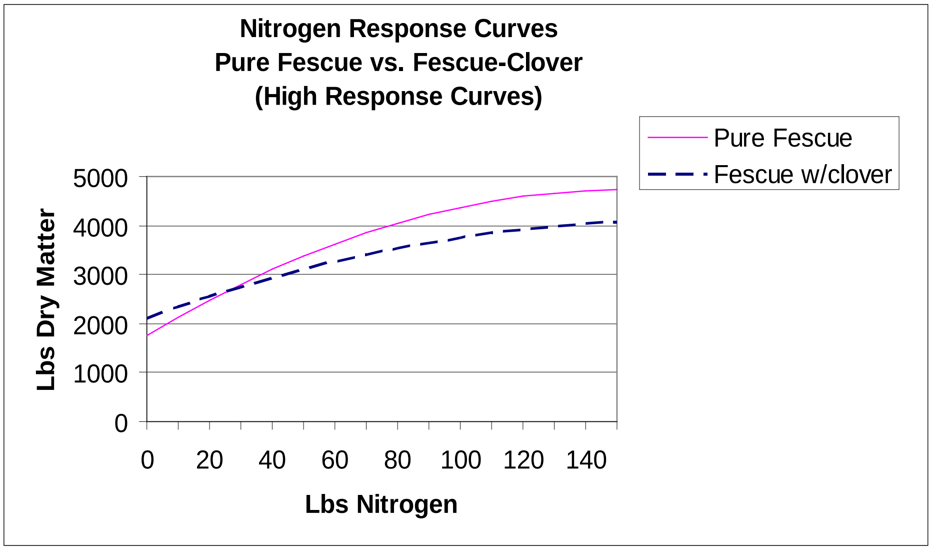
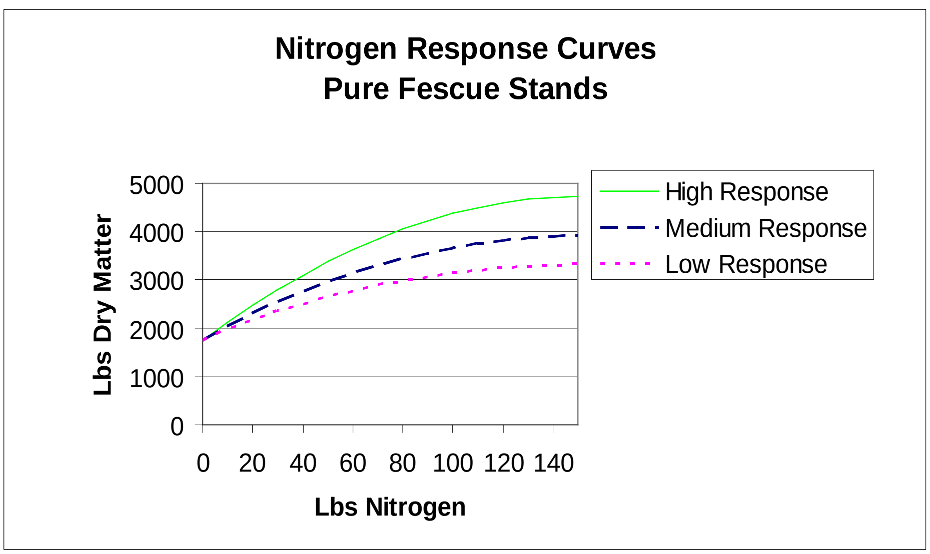
| Table 2 – Recommended N Response Rating Based on Soil Type/Moisture Condition | | | |
|---|---|---|---|
| | **Soil Moisture Conditions** | | |
| ***Soil Type*** | ***Ideal*** | ***Avg.*** | ***Low*** |
| *Excellent* | High | Med/High | Low/Med |
| *Good* | High | Medium | Low |
| *Fair* | Med/High | Low/Med | Low |
| ***Note***: *N should be applied by mid-August for maximum effectiveness. Use appropriately lower N response rating for later applications.* | | | |
| Based on consultations with faculty at the University of Kentucky, Department of Plant and Soil Sciences. | | | |



# OPTIONS FOR GETTING WATER IN EVERY PADDOCK

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Whether you call it rotational grazing, intensive grazing or management intensive grazing, the economic benefits of controlling how and where your cattle graze are well documented. Increased forage utilization, greater stocking rates, greater legume persistence, reduced hay feeding and more uniform nutrient recycling are just some of the many benefits producers can take advantage of when practicing some form of controlled grazing. However, one of the greatest challenges to implementing a controlled grazing system is the delivery of stock water to the grazing animal.

**Water Affects Cattle Performance and Behavior**

Water intake drives dry matter intake. In other words, when water intake is limited, dry matter intake decreases and, as a result, performance or gain declines. Research has also shown that when water is available in the paddock near the grazing animal, average daily gains are higher.

The location of water not only affects performance, but also affects the social and grazing behavior of the herd. Studies at the University of Missouri have shown that when cattle must travel more than 800 feet to water, they tend to move as a herd and spend more time loafing at the water point. Conversely, when water was less than 800 feet away, cattle tended to go to water in smaller groups and spent less time at the water point. They also found that grazing distribution was more variable when cattle were forced to travel farther to water. Forage utilization ranged from 50%, closer to the water point (200 feet), to less than 20% farther from the water point (1,100 feet).

## *System Design and the 800 ft Rule*

The overall goal of any water system design should be to keep cool clean water within 800 feet of the grazing animal. This will enhance water intake and performance, increase forage utilization and discourage loafing at the water point. Less time spent loafing at the water trough means improved nutrient recycling. Since cattle excrete approximately 80% of the N, P, and K they consume, encouraging this return of nutrients to the growing pasture is obviously more beneficial than it being deposited in waste areas at the water point.

Building permanent water points in every paddock is a costly proposition and restricts paddock design changes. In most cases, it is more economical to base your design off of existing water resources. Natural water points such as ponds, creeks and springs may be utilized if cattle access is limited. Use electric fencing to limit cattle access to the entire pond or creek bank. Additionally, coarse rock and geotextile fabric can be used at these areas to prevent erosion and discourage wading or loafing. Cattle do not like to stand on coarse rock for any length of time.

**Permanent Water Points and the Use of Lanes**

The use of lanes leading to a central permanent water point has in some cases been a viable solution to water access for controlled grazing systems. Lanes have a distinct advantage when it comes to moving or sorting cattle for treatment or artificial breeding. But the continued use of lanes can lead to erosion and adversely affect nutrient recycling. Missouri research has shown that when lanes were used for water access, 13% of manure was deposited in the lane and not on the pasture. These potential problems must be weighed against the convenience of utilizing lanes for delivering stock water.

**The Seasonal Water System Concept – Move the Cattle and Move the Water**

A low cost option for delivering water to grazing cattle, which has evolved over the last 20 years, is the use of lightweight 60 gallon portable tubs with full flow valves. These tubs combined with quick coupler fittings, borrowed from the irrigation industry, have revolutionized water delivery in controlled grazing systems. The quick couplers work much like a hydraulic coupler on a tractor. Water from the pipeline only flows into the tub when the hose leading to the tub is plugged into the coupler. So by strategically locating quick couplers along the pipeline, water can be accessed anywhere it is needed. Logically, couplers should be located where they can serve multiple paddocks, however, at $18 a piece the added flexibility of including extra couplers in the system is money well spent. The concept is very simple. When you move the cattle to the next paddock or pasture, you simply uncouple the tub, dump the water and move the tub to the quick coupler in the next paddock. In essence, the water moves with the cattle.

There are basically two options of pipe to use in a seasonal water system. Conventional PVC which must be buried and high density UV- stabilized polyethylene pipe (PE3408/ASTMd2239) which can be used in above ground applications. The cheapest and simplest short term option is an above ground application using the high density pipe. For most small operations, one day of rolling out pipe and attaching couplers is all that is needed to have water in every paddock. From a personal standpoint, I have used this type of system for nearly ten years on rented property and it has held up very well. However, it does have some obvious drawbacks. The pipe is exposed to field work and mowers and although the pipe is very flexible and can be driven over, it must protected anywhere it will be crossed repeatedly such as gateways. Also, the system must be drained at the end of each grazing season to prevent bursts from winter freezing. One great advantage of an above ground system is flexibility. Any changes in paddock design can easily be accommodated by simply dragging the water line to a new location. Also, location of couplers can be changed to reduce waste areas around the water point.

Over the long haul, a below ground system is probably the best option, especially on land you own. Water from below ground systems will be cooler and PVC pipe, which is slightly cheaper than the high density pipe, can be used. The longer life of a below ground water line should more than offset the extra cost of burying the line. Access to quick couplers in a below ground installation can be accomplished by using 6-inch Schedule 20 PVC pipe, drain tile or plastic water meter housing. If using PVC as an access tube, a 6-inch PVC cap (which is pretty costly) or an old disk blade will serve as a cover when not in use.

## Keys to Making it Work

There are several rules to follow to ensure success with small portable tanks.

1. **Keep water within 800 feet of the grazing animal.** This will discourage herd movement and loafing time at the water point.

2. **Protect the tank and coupler.** Never allow cattle to have full access to the tub. This can be accomplished by locating the tub slightly under a polywire fence.

3. **Maintain a minimum flow rate of 6 gallons per minute.** A properly placed 60-gallon tub allows three cows to drink at one time. Since cattle can drink approximately 2 gallons per minute, a 6-gallon flow rate will allow the tank to recharge as the cattle drink. Pipe size, pressure and elevation all affect flow rate. Seek help from your county extension agent or local NRSC before purchasing pipe.

4. **Do not provide shade at the water point.** Shade + water = mud and waste. Anything that encourages cattle to loaf in one area means fewer nutrients are being recycled on the growing pasture.

## Stock Water for Winter Grazing

One of the great resources we have in Kentucky is our fescue forage base which, when Mother Nature cooperates, can provide a tremendous amount of low cost winter grazing. Obviously, seasonal systems with exposed tubs are not an option for winter stock water. However, the beauty of the seasonal system is that it is not needed during the winter anyway. Cattle water intake during the winter is approximately half of summer intake. Additionally, cattle are not as attracted to the water source as they are during the summer and are willing to graze further from water. The 800-feet rule can be broken at this time of the year. So strip grazing stockpiled fescue, beginning at the permanent winter water source, becomes a simple and effective strategy. Cattle spend most of their time during winter grazing out on pasture next to the strip graze fence. Therefore, this is where most of the dung pads will be found providing yet another advantage to strip grazing.

**Will Water Development Pay?**

Most producers will agree that the money they spent on water development was one of the best investments they ever made for their operations. In 1995, Missouri researchers found that by keeping water within 800 ft. of cattle, carrying capacity could be increased by 14% due to better forage utilization. They estimated this advantage to be worth an additional $35 per acre in gross annual income at the time of the study.

Costs for water development can vary a great deal depending on the system. The table below gives current estimates for an above ground, below ground and a combination of below/above ground systems for a 50 acre farm. Total costs per acre ranged from $23 to $162. Using the additional gross annual income of $35 from the 1995 Missouri research, water development could possibly pay for itself in as little as 1-5 years. Producers should also check with Extension and NRCS personnel for the availability of cost share assistance and for professional help in designing watering systems.

**Estimated Costs for Water Development – 50 acre farm**

| Item | No | Unit cost | Below Ground | Above Ground | Combined System[1] |
|---|---|---|---|---|---|
| Below ground pipe (1" PVC 480 psi) | 2000 ft. | $2.25/ft. | $4500 | | $3375 |
| Above ground pipe (1" Poly 160 psi) | 2000 ft. | $0.50/ft | | $1000 | $250 |
| Insulated drinkers | 3 | $1200 | $3600 | | $2400 |
| Portable tank (60 gal.) | | | | $165 | $165 |
| Total costs | | | $8100 | $1165 | $6340 |
| Total cost per acre | | | $162 | $23 | $127 |
| Annual cost/acre[2] | | | $5.40 | $2.30 | $3.85 |
| Required annual increase in output to pay for the system | | | $270 | $115 | $193 |

[1]Combined system - 1500 feet of buried pipe and 500 feet of above ground pipe
[2]Annual cost/acre - 30 year life for buried system and 10 year life for above ground system

# My Grazing Experience: Reflections and Observations

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My pastures are utilized by a beef operation consisting primarily of a small cow/calf herd (30 cows), and a stocker operation numbering from 300-350 head annually, which are grazed only, from spring until fall. These stockers are purchased, continental breed calves, weighing from 500-550 pounds. In the fall, they are sold to Laura's Lean Beef, usually at a forward contracted price after adding 300 pounds of gain. Occasionally, the stocking includes calves not eligible for Laura's Lean which are then sold in truckload lots through internet sales.

While I have been involved in farming and raising beef cattle all my life, my methods and primary enterprise have certainly changed. About 13 years ago, I began to focus more on controlled grazing and better utilization of my forages. The shift resulted in producing fatter cows without the opportunity to market this extra gain. Such opportunity cost overcame my reluctance to switch from cows to a stocker operation.

This move has been good for me because I have always enjoyed producing quality forages. Through better utilization, I am not only producing more pounds of beef per acre, I am also able to sell every pound of gain I produce with stockers.

Certainly, my operation does not reflect an attempt to maximize production, nor am I interested in pursuing maximum production at my age. However, it does compare reasonably well with other beef operations as well as grain production.

For example, my stocking rate for stockers is set to produce from 400 to 500 pounds of gain per acre, depending on quality of forages and rainfall. A pound of gain for the past 17 years has had a gross value from $.55 per pound to my best of $1.26 per pound on a set of calves which occurred with a roll-up in price last year.

What delights me about this method is that I am able to harvest these forages with "tools" (cattle) that are appreciating in value everyday (2 lbs/head/day gain) rather than depreciating everyday as with the heavy metal of tractors, hay balers, combines, etc.

It is also a pleasant bonus to see how the fertility of the soil is maintained through the recycling of nutrients by pasturing versus other methods of harvesting, thereby substantially reducing commercial fertilizer costs.

The cow herd I maintain is mostly an emotional decision. These cows are descendants of a cow herd my dad owned when he was farming and he has been gone 43 years. I also enjoy the husbanding of a cow/calf herd, and with today's prices, it's even more fun!

# TAKING "GRAZING" TO THE NEXT LEVEL

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Since the late 1980's, producer awareness of pasture management has been increasing. A number of factors have brought this about. Mainly, economic conditions have forced producers to look at their bottom line and this has reflected the low returns from mismanagement of forages and pastures. Also, advancements in the technology of pasture management and improvement have made more intensive utilization of the forage resource more economically viable. Advances in equipment, especially fencing and water equipment, have also helped bring about the increased interest in better grassland management.

For the first few years, we observed rapid changes in grazing practices with more management intensive grazing systems being adopted by many producers. However, now we have reached a plateau in grazing standards. The level of progression has not continued upward with new management practices. This being the case, perhaps we need to step back and look at what we are doing right and how we can improve upon that to continue an upward spiral in grazing management.

**Pasture Fertility**

One of the first areas that I notice still under managed is pasture fertility. Soils should be limed and fertilized to produce reasonably high forage yields. Fertilizer practices improve forage quality by providing the nutrients needed to grow high quality forages. With perennial sod crops, it is practical to grow productive and persistent legumes-grass mixtures because legumes fix nitrogen for their growth and the growth of associated grasses.

All plants require 16 essential elements. Carbon, hydrogen, and oxygen come from water and air. The remaining elements come from the soil. Most soils in their native state are capable of providing enough of all nutrients except nitrogen, phosphorus, and potassium. Magnesium, calcium, and sulfur are required in amounts comparable to phosphorus, but are much more available in most soils than phosphorus. It is essential, for producers to develop a good soil testing and fertility program for their pastures. This will enable them to provide the nutrients needed to produce high quality forages for their animals.

Remember forage selection is a key part of any fertility decision. Forages differ in the minimum fertility level needed for persistence and productivity. Legumes require higher pH, phosphorus and potassium levels than most grasses.

**Table 1. Effect of Forage Species and Fertility Levels on Pasture Grazing Days and Carrying Capacity, Ohio State University**

| Forage Species | Soil Fertility | Available Grazing Days | Acres per cow/calf |
|---|---|---|---|
| Bluegrass | Low | 59 | 3.13 |
| Bluegrass Orchardgrass | Low | 89 | 2.08 |
| Bluegrass Orchardgrass | Moderate | 106 | 1.74 |
| Bluegrass Orchardgrass | Good + 130 lb N | 104 | 1.00 |
| Orchardgrass Alfalfa | Moderate | 189 | 0.97 |

**Grazing Efficiency**

There is no magic number of paddocks that a producer must have for a successful controlled grazing system. The optimum number of paddocks will vary with species due to resistance to grazing, regrowth habit, and economic potential. The ideal system would have grazing animals move daily to a fresh paddock. However, this ideal system is often difficult to sell too many producers. The advantages of such a system include minimal feed wastage, very high quality feed each day, reduction of parasite infestations, rapid uniform grazing, and many more. Most producers quickly see the advantage of more paddocks and move in that direction. The objective of increased paddock number is basically to raise stock density to produce uniform grazing.

**Table 2. Levels of Utilization**

| Length of grazing period | Expected % utilization |
|---|---|
| 1 day or less | 80 |
| 3-4 days | 70 |
| 6-8 days | 60 |
| 10 – 14 days | 50 |
| > 20 days or longer | 40 or less |

FSRC, University of Missouri

All of this is obviously tied to forage availability per acre. A more productive crop will support a higher stock density than will a less productive crop. The next question is how to determine what the desired stock density is. We must know three factors to determine this: 1) what is the daily feed requirement, 2) what is the forage availability, and 3) what is the desired utilization rate.  Generally, as stocking rate is increased selectivity of grazing decreases.

Utilization rate is one way of figuring harvest efficiency.  The most desirable harvest efficiency is 100% without damaging the stand.  This is essentially impossible due to the excretory habits of livestock and the fact that they walk on their dinner plate.  Of the forage that grows in the field, 15-25% will have to remain in residual dry matter (RDM) or stubble, as it is usually called.  The amount will depend upon the species being grazed.  Alfalfa requires very little residual because stored energy from the roots will support new regrowth.  Indiangrass will require a higher percentage of RDM because the primary carbohydrates (CHO) storage site is the lower stem and it is also desirable to leave some active leaf area below grazing height.  The longer period of time livestock are allowed to remain on a paddock the more of it they will foul by manure and trampling.  Utilization rate is inversely related to length of stay.  If you want to harvest 75% of the standing crop, the animal better be out there no more than a few hours.  If you are content with 50% utilization, then they might stay a week to 10 days.  For continuous grazing, the generally accepted level of utilization is 20-35%.  The longer the length of stay, the lower stock density will be. It is clear that utilization is very closely tied to stock density.

The actual number of paddocks required for a particular grazing cycle is determined by the necessary rest interval required for that particular pasture mix under the current environmental conditions and by the maximum number of days that animals should be left on a paddock.  Typically the CHO replenishment cycle in forage plants takes 20-30 days, therefore, this is the range in rest interval we should be generally considering. Under good growing conditions, the shorter time frame would be required. In midsummer, the longer time period is required to reach a state of positive CHO balance due to high respiration rates.  The implication is that fewer paddocks or more livestock are needed at certain times of the year.  For most producers, the paddocks not needed for grazing can be harvested as hay or haylage.  The greater the number of paddocks the more fine tuned the proportion of grazed acres to hayed acres can become.  One aspect to bear in mind though is that one 20-acre tract can be harvested more efficiently than five 4 acre tracts.  The use of temporary fencing can facilitate both ends.  Remove the first harvest of the 20 acres as hay in a single block and then erect temporary fencing for controlling grazing on the regrowth.

## Forage Intake and Animal Response

Research on forage intake indicates that intake of forages account for about 75 percent of the difference in animal performance on various forages, and digestibility accounts for about 25 percent.  Voluntary forage intake from pasture is extremely important because without adequate forage consumption by livestock, nutrient intake will not be sufficient to support the desired performance.  In reality, first grazers should be ruminants with high nutrition demands such as high producing milk cows or fattening steers or lambs. Whereas, last grazers could be dry cows or animals with lower nutritional demands.

| **Table 3. Herbage on offer at beginning and ending of grazing periods of differing lengths, forage intake of grazing beef cows, and temporal utilization rate** | | | | |
|---|---|---|---|---|
| **Length of Temporal Grazing Period Utilization** | **Beginning Forage** | **Ending Forage** | **Dry Matter Intake** | **Percent** |
| **Days** | **Lbs/Acre** | **Lbs/Acre** | **Lbs/hd/day** | **%** |
| 2 | 1994 | 1112 | 43.9 | 42 |
| 3 | 2165 | 1141 | 36.9 | 47 |
| 4 | 2231 | 1233 | 28.4 | 45 |
| 5 | 2521 | 1401 | 24.8 | 44 |
| 6 | 2511 | 1345 | 21.5 | 46 |
| 7 | 2984 | 1427 | 24.7 | 52 |

J. Gerrish, F.A. Martz, V.G. Tate and R.E. Morrow, University of Missouri, 1998

**Multi Species Grazing**

As forage producers focus on better utilization of valuable forages, they might want to consider multi-species grazing. Improved forage utilization through a more diverse mix of livestock has shown some economic advantages.

Multi species grazing can offer several advantages. For example, cattle are less selective when grazing than sheep or goats. Cattle prefer grasses and legumes over other plants, whereas sheep and goats are much more likely to eat weeds and brush. Sheep prefer forbs to grass and goats have a preference for browsing on brush and shrubs, and then broad-leaved weeds.

Cattle will tend to graze taller plants than sheep. Sheep will also graze near cattle manure deposits, while cattle will avoid these spots. This will result in more uniform grazing of pastures. This will improve carrying capacity and pasture productivity resulting in increased gains per acre from the pasture.

| Table 4. Influence of sheep and cattle grazing alone and together on body weight and gain by cows and ewes | | | | | | |
|---|---|---|---|---|---|---|
| | Grazing Treatment | | | | | |
| Item | Cows[b] Grazed Alone | Cows[b] Grazed With Sheep | SEM | Grazed Alone | Ewes[b] Grazed with Cattle | SEM |
| | kg | kg | | kg | kg | |
| Initial BW | 491[c] | 481 | 17 | 69[c] | 69 | 3 |
| Final BW | 515 | 519 | 15 | 68[c] | 71 | 2 |
| Total Gain | 24[c] | 37 | 9 | -1.1[cd] | 1.7 | 2 |

[a]Average over 1988, 1989, and 1990
[b]Each value for cows and sheep is the mean of 54 animals
[c]Effect of year (P<0.5).
[d]Effect of treatment (P<0.5)
A.O. Abaye, V.G. Allen and J.P. Fontenot-Influence of grazing cattle and sheep together and separately on animal performance and forage quality, J. ANIM SCI, 1994. 72: 1013-1022

## Extending the Grazing Season

Feed costs represent the major cost in most livestock production systems. Typically, the cost of supplying nutrients to ruminant livestock is much greater using harvested feedstuffs as opposed to grazing pastures or crop residues. The primary function of a grassland farm is to convert solar energy to marketable livestock products in the most efficient manner. The fewer steps between the animal product and the solar energy, typically, the more economically efficient the production systems will be.

Providing grazable forage, in a cost-effective manner to the animal, for as many days of the year as possible should be the goal of the grazing manager. We generally think of winter as the time when most harvest forages are fed. However in much of the country, we should be looking at the spring time and in mid-summer drought as times that we can also extend the grazing season.

## Extending Spring Grazing

Practices that we can use to extend the spring grazing season include: 1) applying nitrogen to a limited number of paddocks for early grazing, 2) use of winter annuals such as cereal rye, wheat or triticale, 3) use of annual or biannual ryegrass, 4) use of growth promotion for forages, 5) high density grazing and 6) early maturing cool season grasses.

| Table 5. Growth Promotion –RyzUp Smart Grass Demonstration (1 year Data) | | | | |
|---|---|---|---|---|
| **Plot** | **Rates** | **Av. Yield** | **Range** | **Range** |
| | | | **Low** | **High** |
| **Orchard Grass** | | | | |
| | 0.3 Oz | 1,092 | 893 | 1,274 |
| | 0.6 Oz | 955 | 872 | 1,024 |
| | 1.0 Oz | 1,244 | 843 | 1,076 |
| | Check | 980 | 843 | 1,076 |
| **Endophyte Free Fescue** | | | | |
| | 0.3 Oz | 958 | 878 | 1,001 |
| | 0.6 Oz | 938 | 910 | 988 |
| | 1.0 Oz | 1,266 | 1,109 | 1,406 |
| | Check | 766 | 691 | 828 |
| **Max Q Novel Fescue** | | | | |
| | 0.3 Oz | 761 | 672 | 869 |
| | 0.6 Oz | 774 | 688 | 831 |
| | 1.0 Oz | 1,1081 | 886 | 1,334 |
| | Check | 763 | 755 | 859 |

University of Illinois Dudley Smith Farm, spring, 2011, E. Ballard and G. Letterly

## Extending Summer Grazing

For the summer drought period we can extend grazing by: 1) incorporating legumes into cool season grasses, 2) use of summer annuals like Pearl Millet, Sorghum Sudangrass or Sudangrass hybrids, 3) grazing legumes such as alfalfa and 4) grazing different types of corn.

| Table 6. Importance of Legumes in Seeding Mixture | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Species** | **2008 CP%** | **2009 CP%** | **2010 CP%** | **2011 CP%** | **2008 TDN%** | **2009 TDN%** | **2010 TDN%** | **2011 TDN%** |
| Orchardgrass | 20.7 | 24.2 | 22.9 | 20.7 | 63.4 | 68.0 | 67.6 | 63.0 |
| Orchardgrass & No Clover | 19.1 | 21.9 | 19.2 | 15.1 | 61.5 | 64.8 | 60.1 | 57.8 |
| Endophyte Free Fescue | 20.2 | 21.2 | 19.4 | 19.1 | 63.3 | 64.9 | 63.8 | 61.2 |
| Endophyte Free Fescue & No Clover | 18 | 19.1 | 15.4 | 15.3 | 61.1 | 63.1 | 58.7 | 56.9 |
| Max Q Fescue | 18.8 | 21.2 | 20.0 | 20.9 | 59.7 | 64.0 | 64.9 | 62.4 |
| Max Q Fescue & No Clover | 18.2 | 16.3 | 15.0 | 16.0 | 58.3 | 61.7 | 57.9 | 56.1 |

University of Illinois-Dudley Smith Farm, E. Ballard, 5 Lbs. of Red Clover and 1 Lb. of White Clover Frost Seeded Annual in late winter on Orchard and Endophyte Free Fescue, and 2 Lbs. White Clover Frost Seeded Annually on Max Q Fescue. Good Stand of Clover in all paddocks when trial test started in 2008. Paddocks sampled monthly from April thru November.

**Extending Fall and Winter Grazing**

Several strategies can be employed to supply forage into the fall or early winter and effectively extend the grazing season by 60 to 90 days, thus reducing the need for stored feeds. These strategies can be categorized into three major groups: 1) stockpiling (conserving cool-season forages in late summer for use in the fall and winter), or 2) utilizing forage crops that continue to grow into the fall, early winter and early spring, and 3) grazing crop residues.

**Table 7. Daily and seasonal forage costs for alternative wintering strategies at typical yields, costs, and period of use based on 100-cow autumn-calving herd. Winter feeding period from Dec 1 to April 10**

| Forage Source | Hay | Cornstalks | Stockpiled tall fescue | Ryegrass + cereal rye |
|---|---|---|---|---|
| $/cow/day | $1.32 | $0.05 | $0.31 | $0.61 |
| Days of use | 130 hay | 60 stalks<br>70 hay | 90 graze<br>40 hay | 90 graze<br>40 hay |
| Wintering cost | $172 | $122 | $70 | $108 |

SOURCE: Jim Gerrish, University of Missouri.

**Summary**

Each day an animal is grazing we are looking at a cost per head per day around 30 cents per day to 70 cents per day. Feeding hay will cost at least $1.25 per head per day or more depending on the type of hay. Management intensive grazing with the goal of trying to graze year around can provide the producer an opportunity to increase the profit potential of their livestock enterprise. Each day you extend grazing is taking a big step to the next level.

**References:**

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