On behalf of the Conference Secretary, Christi Forsythe, and our entire program committee, I want to welcome each of you to Kentucky and our 5th Heart of America Grazing Conference. Special appreciation is expressed to all our sponsors, exhibitors, speakers and moderators. We are excited about the many opportunities that this Conference offers to our “grazing industry”.

We appreciate each of you for taking time from your busy schedules to attend and participate in the Conference. We challenge you to participate fully in all the activities of the day. It is our hope that you will leave with new tools, techniques, practices and information that will be of value to you as you move forward with your grazing program.

Mark your calendars for January 24-25, 2007 and plan to join us at the 6th Heart of America Grazing Conference in Mount Vernon, Illinois.

Best wishes and may 2006 be your BEST YEAR EVER.

Garry Lacefield
HOAGC Program Chairman
Heart of America Grazing Conference
January 25 – 26, 2006
Cave City Convention Center
Cave City, KY

Agenda

January 25, 2006
1:00 PM–5:45 PM Registration / Exhibit Setup

6:00 PM Welcome & Introductions
Dr. Garry Lacefield, UK Extension Forage Specialist

Dinner

Awards
Dr. Ray Smith, Mr. Dan Grigson, & Dr. Jimmy Henning, UK Extension

Program
Forages in Kentucky
Dr. Garry Lacefield, UK Extension Forage Specialist

Can We Graze Year-round in the Heart of America?
Mr. Ed Ballard, Grazing Educator, IL

January 26, 2006
7:30 AM Registration & Refreshments / Silent Auction / Visit Exhibits

8:30 AM Welcome
Dr. Jimmy Henning, UK Assistant Director for Agriculture & Natural Resources

8:40 AM Pastures for Horses: Challenges & Opportunities
Dr. Bob Coleman, UK Extension Horse Specialist

9:00 AM From Traditional Confinement Dairying to Grazing Replacement Heifers
Mr. Bill Payne, KY Dairy Producer

9:20 AM Grazing Program for Goats
Mr. Greg Brann, TN USDA Grazing Land Specialist

9:40 AM Maximizing Production of Beef Cattle on Pastures
Dr. Justin Sexten, Extension Animal Systems Specialist, Univ. of IL

10:00 AM Pastures for Wildlife
Dr. Don Ball, Extension Forage Crops Agronomist, Auburn Univ.

10:20 AM Discussion

10:30 AM Break, Silent Auction, Visit Exhibits
11:00 AM  **Animal Behavior: Impact on Grazing**  
*Mr. Mark Kennedy*, MO NRCS State Grassland Specialist

11:30 AM  **Grazing Programs: Environmentally Friendly, Economically Sound and Agronomically Feasible**  
*Mr. Sid Brantly*, KY NRCS Grazing Land Specialist

12:00 PM  **Lunch**

12:50 PM  **Silent Auction Announcements**

1:00 PM  **Breakout Session**

2:00 PM  **Break**

2:30 PM  **Repeat Breakout Session**

3:30 PM  **Adjourn**

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**Break-out Sessions**

**SESSION 1: Tall Fescue – Endophyte – Animal Relations**

**Tall Fescue from 1931-2006**  
*Dr. Garry Lacefield*, UK Extension Forage Specialist

**Mineral Supplements and Feed Additives – Can They Eliminate Fescue Toxicity?**  
*Dr. John Johns*, UK Extension Beef Specialist

**SESSION 2: Developing Fencing & Water Systems for Efficient Grazing**

**Chargers, Post, and Wire**  
*Mr. Ken Johnson*, KY USDA District Conservationist

**Developing Watering Systems for Efficient Grazing**  
*Mr. Kevin Laurent*, UK Animal Science Extension Associate

**SESSION 3: Non-traditional Forages for Grazing**

**Corn and other annuals**  
*Mr. Jeff McCutcheon*, OSU Extension Educator-Ag. & Natural Resources

**Role of Warm Season Perennials in Grazing Programs**  
*Mr. Mark Kennedy*, MO NRCS State Grassland Specialist

**Turnips, and other brassicas**  
*Mr. Dave Robison*, Ampac Seed Co.

**SESSION 4: Kentucky Producers Panel**

*Dr. Ray Smith*, UK Extension, Moderator

**How We Use Our Pastures**

Horse - Mr. Doug Gehner  
Beef - Mr. Russell Hackley  
Goats/Sheep - Dr. Gil Myers  
Dairy - Mr. Bill Payne
# HEART OF AMERICA GRAZING CONFERENCE

January 25 - 26, 2006
Cave City Convention Center
Cave City, KY

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Heart of America Grazing Conference

Committee Members

Executive Committee

Edward N. Ballard
Animal Systems Educator, Retired
University of Illinois Extension
1204 N. Long Street
Shelbyville, IL  62565
Phone: 217-774-4267
edward@consolidated.net

Bob Hendershot
State Grassland Conservationist
USDA Natural Resources Conservation Service
831 College Avenue Suite B
Lancaster, OH 43130-1081
Phone: 740-653-1559, Ext. 32
bob.hendershot@oh.usda.gov

Mark Kennedy
State Grazing Land Specialist
USDA-NRCS
6726 S. Highway 63
Houston, MO  65483
Phone: 417-967-2028, Ext. 124
mark.kennedy@mo.usda.gov

Garry D. Lacefield
Extension Forage Specialist
University of Kentucky
P.O. Box 469
Princeton, KY 42445-0469
Phone: 270-365-7541, Ext. 202
glacefie@uky.edu

Allen Ullom
Extension Educator, CED
Courthouse Annex 125 S. 8th St.
Cannelton, IN 47520
Phone: 812-547-0416
allen.ullom@ces.purdue.edu

Program Committee Members

Gary Bates
The University of Tennessee
252 Ellington Plant Sciences Building
2431 Joe Johnson Drive
Knoxville, TN 37996-4500
Phone: (865) 974-7208
gbates@utk.edu

Sid Brantly
Grazing Land Specialist
771 Corporate Drive, Ste 210
Lexington, KY 40503-5479
Phone: 859-224-7314
sid.brantly@ky.usda.gov

Bob Coleman
Department of Animal & Food Sciences
912 W.P. Garrigus Bldg.
University of Kentucky
Lexington, KY 40546-0215
Phone: 859-257-9451
rcoleman@uky.edu

Dan Grigson
Lincoln County Extension Agent for Agriculture/Natural Resources
P. O. Box 326
Stanford, KY 40484-0326
Phone: 606-365-2459
dgrigson@uky.edu

Chris Clark
Hart County Extension Agent for Agriculture/Natural Resources
P.O. Box 367
Munfordville, KY 42765
Phone: 270-524-2451
cic Clark@uky.edu

Christi Forsythe
Staff Support Associate
U.K. Research & Education Center, P.O. Box 469
Princeton, KY 42445-0469
Phone: 270-365-7541, Ext. 221
cforsyth@uky.edu
Phil Howell, CCA
Senior Field Sales Manager
Syngenta Seeds, Inc.  NK Brand
110 West French Street
Elizabethtown, KY. 42701
Phone 270-737-3516
phil.howell@syngenta.com

Frank A. Ireland
Research Animal Scientist
University of Illinois
Dixon Springs Agricultural Center
Rt. 1, Box 256
Simpson, IL 62985
Phone: 618-695-2442
fireland@uiuc.edu

John T. Johns
Extension Beef Specialist
Department of Animal & Food Sciences
810 W.P. Garrigus Bldg.
University of Kentucky
Lexington, KY 40546-0215
Phone: 859-257-2853
jtjohns@uky.edu

Keith D. Johnson
Extension Forage Specialist
Purdue University Agronomy Department
915 West State Street
West Lafayette, IN 47907-2054
Phone: 765-494-4800
johnsonk@purdue.edu

Ken Johnson
Kentucky Producer
PO Box 700
Tompkinsville, KY 42167
270-487-6589, Ext 3
ken.johnson@ky.usda.gov

Robert Kallenbach
Associate Professor
Division of Plant Sciences - 210 Waters Hall
University of Missouri
Columbia, MO 65211
Phone: 573-882-2801
kallenbachr@missouri.edu

Tom Keene
Hay Marketing Specialist
University of Kentucky
Dept. of Plant & Soil Sciences
N-222D Ag Science North Bldg.
Lexington, KY 40546-0091
Phone: 859-257-3144
tom.keene@uky.edu

Gary Letterly
Natural Resources Educator-Christian County
1120 N. Webster Street
Taylorville, IL 62568
Phone: 217-287-7246
letterly@uiuc.edu

Melodie Marshall
Natural Resources Conservation Service
District Conservationist
1050 Hwy 72 E
Rolla, MO 65401
Phone: 573-364-6202, Ext. 3
mel.marshall@mo.usda.gov

Jeff McCutcheon
Extension Educator, A&NR
PO Box 1268
Mt. Vernon, OH 43050
Phone: 740-397-0401
mccutcheon.30@osu.edu

Chris Milam
Logan County Extension Agent for Agriculture/Natural Resources
121 S. Spring St.
Russellville, Ky. 42276
Phone: 270-726-6323
cmila2@uky.edu

Justin Sexten
Extension Specialist, Animal Systems/Beef
University of Illinois
Mt. Vernon Extension Center
4112 North Water Tower Place
Mt. Vernon, IL 62864
Phone: 618-242-9310
sexten@uiuc.edu
Victor R. Shelton  
NRCS Grazing Specialist/Agronomist  
2017 Hart Street  
Vincennes, IN 47591  
Phone: 812-882-8210 Ext. 126  
victor.shelton@in.usda.gov

Byron B. Sleugh  
Associate Professor, Agriculture  
Western Kentucky University  
1906 College Heights Blvd. #41066  
Bowling Green, KY 42101-1066  
Phone: 270-745-5968  
byron.sleugh@wku.edu

Ray Smith, Assoc. Professor  
Forage Extension Specialist  
Dept. Plant and Soil Sciences  
N222-E Ag. Science North  
University of Kentucky  
Lexington, KY 40390-0091  
Phone: 859-257-3358  
raysmith1@uky.edu

Roger Staff  
NRCS Grazing/Grassland Specialist  
1111 E. Harris Ave.  
Greenville, IL 62246  
Phone: 618-664-3590, Ext. 3  
Roger.Staff@il.usda.gov

Bill Talley  
Summit Seed Coatings  
10100 South Jefferson Street  
Princeton, KY 42445  
Phone: 270-365-6133  
billtalley@bellsouth.net

Gary R. Tilghman  
Barren County Extension Agent for  
Agriculture/Natural Resources  
1463 West Main Street  
Glasgow, Kentucky 42141  
Phone: 270-651-3818  
gtlighma@uky.edu

Jason Tower, Superintendent,  
Southern Indiana Purdue Ag Center  
11371 E Purdue Farm Rd  
Dubois, IN 47527  
Phone: 812-678-4427  
towerj@purdue.edu

Bret Winsett  
Forage Specialist  
Miles Farm Supply  
Box 22879  
Owensboro, KY 42304  
mobile: 270-791-9420  
brewin@milesnmore.com

Robert Yoder  
Extension Educator – ANR  
P.O. Box 247  
Washington, IN 47501-0247  
robert.yoder@aces.purdue.edu
Heart of America Grazing Conference

Sponsors

Illinois Grassland Conservation Initiative Association
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Exhibitors/Silent Auction Contributors

Gary Allercamp
AGVENTURE D & M, INC.
P.O. Box 794
Elizabethtown, KY  42701

Geoff Frank/Laurentia Van Rensburg
ALLTECH
3031 Catnip Hill Pike
Nicholasville, KY  40356

Dana Tucker
AMERICAN FORAGE AND
GRASSLAND COUNCIL
P.O. Box 94
Georgetown, TX  78627

Gary Moore
AMERICAS ALFALFA
7099 Parkbrook Lane
Cordova, TN  38018

Dave Robison
AMPAC SEED COMPANY
403 Wooster Road
Winona Lake, IN  46590

Ken Carpenter
CAUDILL SEED CO.
1402 W. Main St.
Louisville, KY  40203

Mike Phillips
CAVERNDALE FARMS
1921 Bluegrass Pike
Danville, KY  40422

Brad Bennett
CELPRIL
160 County Road 410
Rienzi, MS  38865

Jacob Bentley
CENTRAL FARM SUPPLY OF
KENTUCKY
2840 Summit Road
Big Clifty, KY  42712

Doug Bastian
FORAGE FIRST
2901 Packers Ave.
P.O. Box 7790
Madison, WI  53707-7790

Mike Simpler
HOLLAND EQUIPMENT
P.O. Box 510
Franklin, KY  42135

Kimberly Field
KENTUCKY DEPARTMENT OF
AGRICULTURE
Forage Testing Program
107 Corporate Drive
Frankfort, KY  40601
<table>
<thead>
<tr>
<th>Name</th>
<th>Company/Contact Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jimmy May</td>
<td>MAY EASTERN GAMAGRASS CO. 4141 Cave Springs Road Auburn, KY 42206</td>
</tr>
<tr>
<td>Bret Winsett</td>
<td>MILES FARM SUPPLY 1855 Pelzer Road Boonville, IN 47601</td>
</tr>
<tr>
<td>Rod Hartzold</td>
<td>MIX 30 – AGRIDYNE P.O. Box 7510 Springfield, IL 62791</td>
</tr>
<tr>
<td>Scott Cooper</td>
<td>MONSANTO COMPANY 707 Huntington St. Bowling Green, KY 42103</td>
</tr>
<tr>
<td>John Langdon</td>
<td>OREGON RYEGRASS COMMISSION P.O. Box 3366 Salem, OR 97302</td>
</tr>
<tr>
<td>Chris Agee</td>
<td>PENNINGTON SEED COMPANY 1280 Atlanta Hwy. Madison, GA 30650</td>
</tr>
<tr>
<td>Randy &amp; John Seymour</td>
<td>ROUNSTONE NATIVE SEED, LLC 9764 Raider Hollow Road Upton, KY 42784</td>
</tr>
<tr>
<td>Darrell Hinkebein</td>
<td>SMARTLIC SUPPLEMENTS 806 W. Briarwood Nixa, MO 65714</td>
</tr>
<tr>
<td>Gary Coughlin</td>
<td>SOUTHERN STATES COOPERATIVE 4272 Clemens Drive Lexington, KY 40514</td>
</tr>
<tr>
<td>Bill Talley</td>
<td>SUMMIT SEED COATINGS 10100 South Jefferson St. Princeton, KY 42445</td>
</tr>
<tr>
<td>Phil Howell</td>
<td>SYNGENTA SEEDS INC./NK BRAND P.O. Box 398 Elizabethtown, KY 42702</td>
</tr>
<tr>
<td>Chad Stanfield</td>
<td>TURNER SEED P.O. Box 739 Lavergne, TN 37086</td>
</tr>
<tr>
<td>Barry Jordan</td>
<td>WAUKARU POLLED SHORTHORNS 7577 S. 210 E Rensselaer, IN 47978</td>
</tr>
</tbody>
</table>
Feed costs represent the major cost in most livestock production systems. A recently completed analysis of 225 Standardized Performance Analysis (SPA) Beef Cow Records on herds in Illinois and Iowa showed that feed cost was the overriding factor determining profitability, explaining over 57 percent of the herd-to-herd variation. 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.

EXTENDING GRAZING IN THE FALL AND WINTER

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 two 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 and early winter.

Not all cool-season species are adapted to stockpiling because most species reduce growth in the fall because of shorter day lengths and/or lose leaves (quality) after being frosted. Tall fescue and birdsfoot trefoil are two forage species, which are suited to stockpile management because they continue to grow into the fall and do not lose leaves, as readily as other cool-season species after frost.

Stockpiling Tall Fescue
Tall fescue is a deep-rooted, long-lived, sod-forming grass that spreads by short underground stems called rhizomes. It is drought resistant and will maintain itself under rather limited fertility conditions. Animals readily graze tall fescue during the fall and winter, but show some reluctance to graze it during the summer months of July and August. Some of this reduced summer palatability, which results in poor animal performance, is associated with the presence of a fungus in the plant (endophytic). Endophyte-free varieties are now available. Tall fescue is the best-adapted cool-season grass for stockpiling.

Tall fescue will maintain more active growth at lower temperatures than most other cool-season grasses and so will continue to accumulate yield later into the year. In response to shortening day length and cooler night temperatures, tall fescue accumulates a high level of soluble carbohydrates in both the leaves and stem bases. With up to 20 percent of the dry weight of the plant as free sugars, the nutritive quality of fall grown tall fescue is quite high. The heavy waxy layer or cuticle
on the leaves makes the plant more resistant to frost damage than most other cool-season grasses.

To stockpile tall fescue, don’t graze it from early to mid August through mid-October. Cattle and sheep perform less than optimally on it during this period. Tall fescue is also very responsive to nitrogen fertilization. To produce a high yielding, high quality stockpile, the pasture should be grazed or clipped fairly short and 40 to 80 pounds of nitrogen per acre applied 60 to 90 days prior to the end of the growing season. Normally, that is early to mid-August. If soil moisture is favorable, the higher rate of N may be applied. If the summer has been dry, application of more than 40 lb N/acre may not be profitable.

If the red clover component of a mixed fescue-clover pasture is greater than 30 to 40 percent, it is probably not cost effective to apply additional nitrogen.

Some recent work has indicated that a mixture of Orchardgrass and tall fescue can be stockpiled for early fall grazing.

In Illinois daily feed cost for stockpiling Max Q Fescue has ranged from 20 to 30 cents per day.

**FALL GROWING FORAGE**

The growth of some forage species is not adversely affected by cooler fall weather and shorter day lengths, as are many cool-season types of forage. The species, which seem to grow best in the fall, are perennial ryegrass, small grain cereal crops such as rye, wheat, oats and triticale, and certain brassica crops like turnips, rape and kale.

**Brassicas**

Brassicas are annual crops that continue to grow during the fall and into the winter. They are highly productive and digestible and contain relatively high levels of crude protein. Sheep producers probably more commonly use these than cattlemen. Early to mid-August establishment is best suited for November-December grazing. Animals will readily consume the plant tops and will also grub the root bulbs out of the ground. The plants tops will typically contain 16-18 percent crude protein and the roots are highly digestible carbohydrates. These crops are best suited for crop rotation pastures or no-tilled into light sod. Total dry matter yield is very variable and is highly dependent upon soil type, fertility, time of seeding, and precipitation.

Turnips grow fast and can be grazed as early as 70 days after planting. They reach near maximum production level in 80 to 90 days. Including spring oats with the turnips increases both the total production and digestibility of the forage. The proportion of top growth for turnips to roots can vary from 90 percent tops/10 percent roots to 15 percent to/85 percent roots. Turnips can be seeded any time from when soil temperature reaches 50 degrees until 70 days prior to a killing frost. Ideal time for fall seeding is sometime during the first 15 days of August.

Rape is more easily managed for multiple (generally more than two) grazings than are the other brassica species. Approximately six to ten inches of stubble should remain after the first grazing of rape; this practice promotes rapid regrowth. Regrowth of rape may be grazed at four-week intervals. On the final grazing, the plants should be grazed close to ground level.

Swedes, likes turnips, produce large edible roots. Swedes yield more than turnips but require 150 to 180 days to reach maximum production. Swedes is one of the best crops for fattening lambs and flushing ewes. Yield is maximized with a 180-day growth period for many varieties while most hybrids; on the other hand, produce greatest yields when allowed to grow 60 days before first harvest and 30 days before the second harvest.
ESTABLISHMENT OF BRASSICAS

Brassicas require good soil drainage and a soil pH should be in the range of 5.5 to 6.8. Brassicas can be no tilled into a sod provided it has been killed with glyphosate. This reduces insect problems. They can also be seeded into wheat stubble. Clean till seeding works well but may have increased insect pressure. If seeding after crop farming, herbicide carryover residues are an enormous problem for Brassicas and small grains. Some commonly used herbicides can affect the establishment and growth of Brassicas for up to 24 months. As a rule, carry-over label recommendations for sugar beets are usually applicable to most members of the Brassicas family. Use 2 to 4 lbs/acre of seed for turnips and 3.5 to 4 lbs/acre for rape or kale. Drill the seed on 6-8 inch row spacing and place seed no more than 0.5 inch deep. When seeding spring oats or cereal rye with turnips the usual seeding rate is 1.5 to 2 bushels per acre of the small grain. Some producers have had success in aerial seeding of turnips, spring oats and cereal rye in to standing corn in mid-August. Again, check out your herbicide program for potential carryover and grazing restrictions before trying this method of seeding.

Fertilizer should be applied at the time of seeding to give the brassicas a competitive edge on weeds. Apply 75 to 80 pounds per acre of nitrogen and fertilize with phosphorus and potassium similar to what would be applied for a small grain.

Turnip Varieties
The old standard variety of turnips has been Purple-Top, but newer varieties would include Dynamo, Sampson, Barkant, Rondo, Appin and Forage Star Turnip.

How to Graze
When possible, turnips should be strip-grazed (size of available grazing are controlled by temporary electric fencing) during the growing season, much like a rotational grazing system. During the growing season strip grazing with a break wire in front of and behind the animals can be used to control consumption, allowing regrowth, preventing wastage, and conserving available dry matter. Strip grazing limits grazing damage to the root and lower leaf, allowing leaf surface for regeneration of plant growth. If regrowth is desired, at least two inches of leaf should be left intact. Generally animals will consume the leafy portion of the plant before progressing to the root portion.

In Illinois, depending on seed method and kind of winter, depending on how much supplemental feed is required, cost of grazing has ranged from 24 to 78 cents per day.

SMALL GRAINS

The use of winter cereal crops such as wheat, rye, spring oats, barley, or triticale can provide fall or early winter grazing opportunities. However, certain management practices need to be modified from what is normally done for grain production. When small grains are used for grazing, plant them three to four weeks earlier than for grain production. Increase the seeding rate to 2 ½ to 3 bushels per acre and apply nitrogen at the rate of 40 to 60 lb/N per acre at planting time.

Rye will be more productive than wheat or triticale for both fall and spring production. However, grazing quality will be better with triticale than for rye. Spring oats seeded in the fall can be very productive but will die out over the winter. However, with adequate fall moisture, grazing should be available from October through December and then again in early spring for the rye, triticale and wheat.

Stocking rate and time of grazing will be somewhat determined by the intended use of the crop. If you are planning to take a silage or grain harvest, grazing should only be moderate. Heavy grazing can reduce grain yields. Moderate grazing in the fall will
not result in significant silage or grain losses provided that moisture and soil fertility are adequate. In fact, fall pasturing can be beneficial where the small grain was seeded early and has made excessive growth and soil conditions are dry.

Spring grazing may be started when growth resumes. If a grain or silage crop is to be harvested, grazing should be discontinued when the plants start to grow erect, just before jointing (growth stage). Grazing at any time after their growing points are above the ground will injure small grain plants.

**CROP RESIDUES**

**Corn Stalks**
In mixed crop and livestock operations, corn and grain sorghum stalk fields can be used to supply substantial grazing days. As grassed waterways, terraces, and field borders become more widely used, this option becomes even more attractive.

The crop residues represent about one-half of the plant dry matter and, therefore, a field producing 120 bushel corn grain will have close to 3 to 4 tons of roughage dry matter per acre. The optimal grazing allowance on corn crop residue fields is dependent on the weight gains necessary to obtain a desired body condition. With low supplementation, cows can maintain bodyweight with as little as .5 acres corn crop residues per cow per month, but may need as much as 2 acres per cow per month if bodyweight gain is necessary.

Because grazing cattle will select the portions of crop residues with the highest digestibility and protein concentration, needs for supplemental feeds beyond trace mineral salt and vitamin A are likely to be minimal for the first month of grazing. Simultaneous grazing of stockpiled grass or legume forages (late summer growth) may also supply protein and energy and, thereby, reduce needs for supplementation. As winter progresses and crop residue quality decreases because of grazing selection and weathering, supplementation of protein and phosphorus may become necessary.

**Grazing Dormant Alfalfa**
Another option that has become increasingly popular for extending the fall grazing season has been to graze the regrowth of alfalfa hay fields or pastures after cold weather has ensured dormancy. Usually 2 to 3 days of successive temperatures in the 24-27 degree Fahrenheit range should be experienced before grazing alfalfa. It is important to graze early enough to utilize the forage while still in a leafy palatable state. If grazing is delayed until freezing has desiccated the plants and caused most of the leaves to drop, then the cows or sheep had just as well be kept off. An added benefit to fall grazing alfalfa is that research and farmer experience indicates a reduction in alfalfa weevil populations the following spring. This is due to removal of some of the stems where weevil egg masses over winter. Some points of concern when grazing alfalfa hay fields are not to graze when the soil is saturated, as this will cause long term stand damage and roughen the field. Enough stubble, 3 to 4 inches, should be left to catch and hold snow to reduce winter damage to the plant crowns and minimize temperature fluctuations, which result in plant heaving.

**Grazing Maize (Corn)**
Grazing Maize is a selectively bred composite designed to graze by livestock. Grazing Maize can be grazed during late summer months or allowed to mature and be grazed as standing corn during the winter months. Also, to prevent corn wastage, daily strip grazing is required. Some source of dry feed should also be fed to cattle while grazing Maize.

Plant population should be nearly the same as traditional planting rates and can be planted with a regular corn planter.
**Frost Seeding**

Legumes can be interseeded into grass stand by several methods. The important criterion for success is to achieve good seed-soil contact. If the seed never makes it into the soil, it is not likely to ever become established. Different seeding methods are appropriate for different legume species.

Frost seeding works very well for all clovers and lespedeza. Seed-soil contact is achieved through freezing and thawing action drawing the seed down into the soil. If there is a heavy thatch layer on the soil surface, the seed may never actually reach the soil. Frost seeding where cattle have grazed during the fall or winter and disturbed the thatch is a good strategy. The clovers tend to be more tolerant of cold temperatures in the seedling stage than is alfalfa or birdsfoot trefoil, thus making clovers better adapted for frost seeding. In Illinois the window of opportunity for frost seeding is between February 15 and March 15.

Frost seeding red clover into tall fescue can help improve the quality of the pasture while also helping to keep it more productive during the summer months. Ideally a mixture of 30 to 40 percent red clover and the remainder tall fescues will help decrease the summer slack production of straight tall fescue.

The keys to frost seeding success are to graze the grass down in the fall. Then frost seed the legume in the spring and next graze back the early flush of spring grass and then allow for a rest period from grazing providing time for the legumes to become established.

**EXTENDING THE SUMMER GRAZING SEASON**

**Cool-season Grass-Legumes Mixtures**

Growth of cool-season grasses such as tall fescue, Orchardgrass, perennial ryegrass, or smooth bromegrass is limited in the summer by both high temperatures and soil moisture deficiency. Photosynthesis in cool-season plants becomes much less efficient at higher temperatures. Heavy grazing without rest also reduces total leaf area available to the plant to support maintenance and growth. The combined effect of reduced photosynthetic efficiency and diminished leaf area is low summer pasture production.

Cool-season legumes such as alfalfa and red clover have somewhat higher optimum growth temperatures than do the cool-season grasses and are frequently more deeply rooted. For these reasons, cool-season legumes tend to be somewhat more productive in the summer months. Interseeding legumes into grass dominant pastures can be the first step toward extending the summer grazing season. Grazing management, which provides planned rest periods for the pasture plants, is essential for the maintenance of legumes in pasture.

In a Management Intensive Grazing system, we can also control grazing pressure to the extent that reproductive stems in the grasses can be grazed off in the early stages of elongation. This will typically result in early initiation of tillering and production of more vegetative regrowth during the summer months. The same management used to accomplish this goal of seedhead suppression will also encourage legume development in the sward. The combined effect is greater levels of higher quality cool-season forage in the summer months.

In Illinois cost per grazing day has ranged from 14 to 40 cents a day for cool season grasses, with cost of land rent ranging from $50 to $150 per acre.

**Warm-Season Perennials**

Warm-season grass species can be used as an alternative to cool-season pastures in the summer months. Warm-season perennial species would include the native tall grass prairie species such as big
bluestem, eastern gamagrass, indiangrass, and switchgrass as well as introduced species such as Caucasian bluestem and bermudagrass.

The native species are quite sensitive to grazing management and will respond well to plan rotational grazing. In fact, some recent evidence has shown that under control grazing systems cool-season and warm-season grasses can be interseeded and the warm-season grasses will become an important part of the stand and help increase production during the warm summer months.

We have found cost per day of grazing averaging around 80 cents per day with land rent at $150 per acre.

**Warm-season Annuals**

Spring and summer annual crops such as pasja, forage oats, sudangrass, sorghum-sudan hybrids, pearl millet, and crabgrass can also be used to supplement cool-season pastures. The limiting factor for the use of these crops by many producers is land availability. While overseeding and no-till establishment can be used successfully for some warm-season annual species, many respond more favorably to seeding on a tilled seedbed. Cost of establishment and potential for erosion losses are two main deterrents to the use of conventionally seeded annual crops.

Because annual crops are typically high investment crops, management to fully utilize the crop is essential. This is particularly true with the taller growing species where wastage can be very high if feed budgeting is not tightly followed. Animal output per acre can frequently be doubled if grazing periods are kept to fewer than 3 days compared to periods of 14 days or longer.

Type of growing season and land rent can have a significant impact on cost per day for grazing. We have found cost to range between 50 and 70 cents per day, to over $1 per day in dry summers. Land rent charges have been between $90 and $150 per acre.


2. Winter Cost to Graze Turnips, Spring Oats, Cereal Rye and Corn Residue (Cents per day)
Pastures for Horses: Challenges and Opportunities

Bob Coleman
Department of Animal and Food Sciences
University of Kentucky

Horses were born to eat grass and how they evolved has allowed them to be efficient users of a high forage diet. In fact, for many of today’s horses, they will survive and thrive on an all forage diet.

When you compare a horse owner to someone raising other classes of livestock, there are some definite similarities, but also some striking differences. It is in the differences and similarities that you find the opportunities and challenges related to the use of pastures by the horse owner. While both can and do use pasture as part of their feeding programs, the horse owner is often more willing to use supplemental feeds and not rely on pasture as a major nutrient source. In years past, many speakers at the Heart of America Grazing Conference have talked at length how they want to maximize pasture and reduce or remove any reliance on stored forage in their livestock operations. For the horse owner, using pasture does provide an opportunity to reduce their need for stored or purchased forage supplies. However, the challenges they face to do this are reflected in the production goals they have, the availability of pasture land and the other resources required to maximize grazing opportunities.

For a moment, consider the opportunities. The many forage species that will grow in this 5 state area can provide significant amounts of feed. While a Bluegrass pasture may produce approximately 2 tons of dry matter per acre, some of the other cool season forages properly managed, can provide up to 4 tons of dry matter and if a legume is added, these yields can easily be exceeded. The total forage available will provide adequate nutrients to meet the nutrient needs of many classes of horses. The nutrients provided by some of the common forages can be seen in Table 1. In addition to the nutrients listed in Table 1, the nutrient requirements for a mature horse at maintenance are also listed. It should be noted that for the mature horse at maintenance, quality pasture can meet the horse’s nutrient requirements and in some cases, exceed them. Researchers have demonstrated that using a combination of both cool and warm season grasses in pasture, the forage produced was able to provide nutrients needs to sustain adequate growth rates of yearling horses (Rouquette et al 1985). The yearlings grazing Bermuda grass pasture were fed a concentrate mix that did increase the horse’s daily gain, however the pasture only horses had growth rates that were 0.50 kg/day which is considered to be a moderate growth rate by NRC ’89 standards. In a similar study with yearlings fed concentrate to increase energy intake the horses fed the greatest amount of concentrate did out perform the pasture only horses but the differences were related to daily gain as there was no difference in any of the skeletal measurements (Hansen et al 1987). The difference in growth rate was due to a greater energy intake but the pasture only horses did perform at an acceptable level indicating that a good quality pasture with an adequate yield can meet the nutrient needs of a growing horse.
Table 1. Nutrient Composition of Common Pasture Forages versus Nutrient requirements of Mature Horse at Maintenance.

<table>
<thead>
<tr>
<th>Forage Typea</th>
<th>Dry Matter</th>
<th>DE Mcal/lb.</th>
<th>Crude Protein</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kentucky Bluegrass</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetative</td>
<td>31</td>
<td>1.44</td>
<td>17.4</td>
</tr>
<tr>
<td>Mature</td>
<td>42</td>
<td>1.12</td>
<td>9.5</td>
</tr>
<tr>
<td>Orchardgrass</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetative</td>
<td>23</td>
<td>1.44</td>
<td>18.4</td>
</tr>
<tr>
<td>Mature</td>
<td>35</td>
<td>1.06</td>
<td>8.4</td>
</tr>
<tr>
<td>Ladino Clover</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetative</td>
<td>19.3</td>
<td>1.14</td>
<td>25.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Horse Requirementsb</th>
<th>DE Mcal/lb</th>
<th>Crude Protein</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance</td>
<td>0.90</td>
<td>8</td>
</tr>
</tbody>
</table>

a Maximizing the Value of Pasture for Horses ID167. K.D. Johnson
M. A. Russell Purdue University Cooperative Extension Service.

In the case of broodmares that are commonly maintained on high forage diets it has been reported that open mares will have reasonable reproductive efficiency on a pasture only system but when the stress of lactation is included native pasture may not be of sufficient quality or quantity to meet the horse’s nutrient needs to have acceptable reproductive efficiency (Gibbs and Davison 1991).

For many livestock producers the use of alternative forages to extend or provide addition grazing is a common management practice. However for the horse owner the use of annual cereal crops such as wheat or oats is generally not an option due to limited access. If however that access is available grazing crops such as wheat can be effective. Webb and co workers (1993) reported daily gains ranging from 0.5 – 1.0 kg/day for horses grazing winter wheat. The young horses gained the least amount of weight while the older horses gained 1.00 lb/day. A concern with this is the horses may be gaining too much weight and owners would need to control access to forage such as wheat pasture to prevent problems associated with over weight horses.

Can horses be raised to today’s standards with pasture being a significant source of nutrients? Based on the research just discussed the answer clearly is yes. Why do horse owners still rely on purchased feed supplies to supply nutrients to their horses? In many cases it is because many of today’s horse owners have horses for other reasons such as sport and recreation rather than considering their horse operation a production unit. While there are many farms with the acreage and horse numbers to be a production unit and that is what they are, there are those that have small acreages and a small number of horses. It is with the small operation that the opportunities and challenges related to pasture are the greatest.

What are the opportunities? The biggest opportunity is the ability to grow high quality forage in abundant amounts even on a small farm. By taking advantage of advice related to species selection, seeding rates, fertilization and other agronomic practices...
horse owners can have productive pastures that will meet their needs. There are challenges associated with this, as many owners lack the necessary resources to implement all that is suggested to them. Larger producers may have the equipment available and expertise to manage their pastures taking advantage of the many pasture options. For many keeping their horses on small acreages equipment may not be available and there may be a need to have many activities done by a custom operator. While this can be effective there are times that getting the operator to come to the farm at the correct time is a big challenge.

The opportunities exist but what other challenges does the horse owner face? In general it is the horse. It is commonly recommended that horse owners have a minimum of 2 acres of pasture for each adult horse. Under normal growing conditions, this amount of pasture should produce sufficient forage to meet the horse’s nutrient needs. Horse owners can, however, reduce this acreage requirement slightly by using good grazing management. The challenge is to encourage horses to use more of the available forage and reduce spot grazing. The most effective practice to accomplish this is to use a rotational grazing program.

The rotational grazing system needs to be based on the concept of moving the horses based on forage availability. Grazing is started when there is at least 6 -8 inches of available forage and then horses would be moved to the next pasture when they have grazed the area to an average of 3-4 inches. This allows the forage to have reserves for re growth and while it does not eliminate selective grazing it can help to reduce it. The rotational system provides opportunities to better use the available forage and can in most situations extend the grazing period. This extension the grazing time can significantly reduce the amount of hay that is needed. For many horse owners that may not be the most critical reason for practicing a rotation system but the improved stand vigor or the fact that grass is left at the end of the season can be very important. In a demonstration at the University of Kentucky over a summer grazing period, two mature horses were maintained on a 2.3 acre pasture divided into 3 separate paddocks. The horses were rotated every 14 days which resulted in 14 days of grazing followed by 28 days of rest for each paddock. The horses grazed from mid-May to mid-November, and during this time, maintained body weight and body condition with no supplemental feed. When the horses were moved from pasture, there was 5-6 inches of forage still on the pasture. There was evidence of lawns and roughs in the paddocks but it was limited. It is important for horse owners to leave at least 3-4 inches for forage when they rotate the horses out of the pasture. By leaving this amount of forage there should be reasonable recovery to the grazing height of 6-8 inches in time if growing conditions are reasonable. The moving of horses when forage is low to a new area is easily done but there is a need to ensure that there is a suitable land base to allow for the recovery time the pasture needs based on the growing conditions in the area. Moving horses based on the calendar only can quickly result in over grazed pastures because there has not been sufficient time for the plants to recover. For the horse owners this means walking the pastures as part of the decision making process. In a second demonstration at the University of Kentucky 2 groups of 4 horses were rotated between 2 acre paddocks on a 14 day cycle. This allowed the pastures only 14 days to recover from grazing before the horses were returned. The result was that the horses were able to maintain body weight over the early summer but when growing conditions were not favorable they lost weight and created significant areas of bare ground in the pastures. This was similar to the scenario seen on many small horse farms where there are too many horses and a limited amount of pasture.
If growing conditions are such that pasture does not recover soon enough, horse owners will need to make the decision that the horses are fed hay for a period of time till the pasture has time to recover. If horses are being fed on pasture there may need to be some restrictions as to where the horses can go just because they are being fed hay does not mean they won’t continue to graze and over graze parts of the pasture. Having a smaller area designated as a sacrifice area can be helpful as it can reduce the total area that needs to be renovated when growing conditions improve. This sacrifice area can be a valuable asset during both dry and wet conditions when horses can significantly damage the pasture.

Another challenge for the horse owner is to use all the forage available when it is rapidly growing. One way to look after all the extra forage is to purchase more horses to eat the grass, but that generally results in a horse population greater than what the land base can handle. A better alternative is to use a managed intensive grazing system. This practice means more horse density on the pasture area for a shorter period of time. To be effective, horse owners need to divide the pasture into a larger number of paddocks and allow grazing for only 3-5 days. The horses need to be moved once the available forage has been grazed to 3-4 inches. With a greater number of paddocks, there will be ample time for re growth of the forage. In addition as the forage growth rate slows during the later part of the season the size of paddock can be increased as the horses are better able to keep up with the pasture growth. This management practice does require more resources of facilities and time as there will be more paddocks and more time spent assessing forage supplies and moving horses.

How can horse owners deal with those pastures that have grown faster that they were able to use them, resulting in more forage than the horses are able to eat. In these situations, it would be wise to bale hay if the equipment is available. However if the baling of the pasture is not a practical solution horse owners will need to consider that horses grazing taller forage tend to waste significant amounts of the feed, but they also graze more selectively creating areas that are essentially overgrazed. When these pastures are rested, the over grazed or preferred grazing areas will be less mature than other parts of the pasture and horses may spend more time in these areas effectively over grazing them and causing areas of bare soil. If the pasture is mowed to eliminate the maturity difference that can help but may not eliminate the problem of grazing selection.

An added concern when there is more forage than the horses being fed require, is how to limit feed intake. As horses will graze for 12 -16 hours per day limiting intake may mean limiting access to the pasture. Horses may need to be stabled or confined to a dry lot for some period of each day to reduce forage intake and the possible problems associated with obese horses. If stabling is not an option horses may need to be fitted with a grazing muzzle for a portion of the day or all day to restrict intake. If the horse is limited to only a few hours of grazing per day the horse owner will need to watch changes in body condition to ensure that they are receiving adequate daily intakes to meet maintenance requirements. In many cases those feeding other classes of livestock maximum intake is needed and sought after while for the mature horse at maintenance controlling weight gain becomes a serious challenge.

It has been previously mentioned the need for a sacrifice area to allow horse owners the option to remove horses from pasture when environmental conditions are such that pastures may be damaged by hoof action. For most horse owners they might consider using a sacrifice area during wet conditions in the spring or fall when hoof damage can be significant on soft wet pastures. However, the consideration for hoof damage on dry pasture should also be
included in the management scheme. Regardless of why a sacrifice area is developed, it will mean providing an alternative source of nutrients to the horses as they won’t be grazing. The use of a sacrifice area may be more important to those owners that have limited land resources and need to protect what they have.

Pasture design may have some effect on where horses grazing. In cases related to exercise areas, it is often suggested that rectangular runs promoted more exercise. What design will foster even forage for consumption is unknown at this time. Certainly, areas within pastures that are social areas, shade, water, or the gate can result in reduced forage stands, more weeds, and mud during wet conditions.

Areas where manure is deposited, are not generally grazed by the horse and are significant contributors to the development of lawns and roughs. Owners need to spread manure to aid in its breakdown and prevent those areas of rank growth. Concern over parasite problems due to the spreading of manure becomes a challenge and needs to be dealt with. Horse pastures should be harrowed during hot dry conditions as an effective means to reduce the potential parasite load on the pasture. This may mean pastures are harrowed only once or twice during the summer grazing period, causing a build of manure. If horses could be maintained for a period of time in the sacrifice area, there may be more opportunities to drag pastures and reduce manure build up.

The opportunity is to grow forage that can and will provide feed to meet the nutrient needs of your horses. Can pastures provide forage for horses on a year round basis as is being tried by other grazers. This seems like an insurmountable task and it may well be. However the challenge is there to maximize the use of pasture on horse operations regardless of the operation size. Good pastures make for healthy horses and a healthy environment. It is a great challenge.

**Literature Cited**


Johnson K. D. and M.A. Russell ID 167 Maximizing the Value of Pasture for Horses Purdue University Cooperative Extension Service


A Tale of Two Businesses:

I would like to share an account of a transition from a conventional dairy operation to our current Management Intensive Grazing (MIG) enterprise. In 1974, I joined my father who at that time had been dairying on a 265 acre farm in Lincoln County, Kentucky for twenty five years. We fed our registered Holsteins corn silage and alfalfa haylage and purchased a manufactured feed. Our herd of 70 Holsteins spent most of their time on concrete. We did make an effort to allow access to an exercise lot when weather permitted. However, during the greater part of the 1990’s we spent a great deal of time treating various hoof problems. These problems included heel warts, abscesses and foot rot. I was spending more time trimming hooves than managing the dairy. Milk production was more than adequate, but herd health was not. We had always raised our own heifers, mostly on pasture; their health was acceptable. Foot problems were almost non-existent for these heifers.

We also had about 120 beef cows on another farm of 450 acres. Our beef herd was grazed as long as possible, then received alfalfa/orchardgrass balage when pasture resources declined. They were never on concrete and their health problems were minimal.

In April 2000, I attended the Kentucky Grazing School held in Washington County. The grazing techniques presented there seemed to be much simpler and more in synch with nature than the drylot operation which we were employing for our dairy herd. Not only could the animals harvest their own feed, but they could spread their own manure! Perhaps the most important advantage, it seemed to me at the time was better hoof health. In addition, our farms were rolling to steep and better suited to grazing permanent pastures than to tillage. I decided to move any future operation in the direction of MIG.

When my father retired in August 2000, I made a business decision not to purchase his interest in the dairy herd. The dairy herd went to Louisiana at that time. While the dairy business had been very good to our family, I elected to pursue a business model which would provide less stress and more free time than the dairy offered.

I continued to raise the remaining dairy heifers on pasture. The beef operation was expanded by backgrounding purchased steers. In December 2001, I had the opportunity to become involved in a network of dairy heifer growers. I purchased 100 of these heifers from Michigan and began grazing them. In January 2003, I sold the beef herd and am now raising dairy heifers exclusively. There are about 400 of these heifers on the farm at a given time.

In order to better utilize our larger pastures, I decided that electric fencing was necessary. We had used solar chargers in the past, but realized that we needed reliable power over the entire farm. We installed high tensile wire on existing
permanent fences throughout the property. This allowed us to attach temporary polywire fencing wherever we liked. Since then, we have replaced some of our woven wire interior fencing with two or three stands of charged high tensile wire supported by fiberglass posts. Wood posts provide support at the ends and at corners. This fencing is far less expensive and much easier to install.

At this point, water became the limiting factor. With the advice of Bo Renfro and Ken Johnson from NRCS, and Dr. Jimmy Henning and Dan Grigson from the CES, I drew a plan to extend waterlines around both farms. Bo Renfro, District Conservationist in Lincoln County assisted by securing cost share money that enabled me to implement that plan, which included fencing off Hanging Fork Creek. We installed 4½ miles of 2 inch PVC water lines that provided water to our pastures. We utilized portable water tubs which coupled to the water lines with quick couplers. Most of this water is provided from a municipal water source; the remainder comes from a lake on the farm. We do have two spring fed water tanks. We try not to allow direct access to ponds. Our portable tubs have remained useful down to 0° F during winter by allowing a continuous small flow of water into the tank.

State (Phase I) cost share dollars allowed me to improve our cattle handling facilities and to install feeding pads of geotextile fabric and gravel. These feeding pads have been most valuable during periods of wet muddy weather.

Proper design of cattle handling facilities is very important in order that animals may be handled with a minimum of stress. In the past, the infrequent handling of our beef cows and purchased steers resulted in a great deal of stress for both cattle and people. Providing feed in a trough on a daily basis has allowed us to make friends with our heifers and has virtually eliminated the stress of moving and handling cattle. An alternative to daily feeding in a trough can be a “lead steer” that has been trained to come when called. Where we once conducted “roundups” with trucks and lots of whooping and hollering, we can now call our heifers when we change pastures or gather them for sorting in the corral. This is primarily a result of a major change in philosophy and attitude of the people and training of the cattle. I feel very strongly that less stress results in better herd health and production as well as a much better attitude on the part of people. Moving and working with our heifers is far less stressful for both cattle and people now.

Our current feeding program for our heifers provides pasture and about 4-6 pounds of corn gluten feed, soyhull pellets or ground corn, depending on the quality and type of forage available. Two ounces of a custom mineral is topdressed over the feed in the trough. I utilize cool season grasses (mostly fescue) with clover during the spring months. From May until September 15, we graze about 80 acres of alfalfa/orchardgrass pasture in addition to the fescue/clover pastures. From September 15 until November 1, the alfalfa is allowed to regrow to provide root reserves for winter. During this time, the heifers have standing corn and fescue/clover pastures. After November 1, we offer the remaining dormant alfalfa/orchardgrass. When the alfalfa/orchardgrass is gone, the heifers get stockpiled fescue that we hope will last until green up in March. Since we will not normally have enough stockpiled fescue to provide all the feed through winter, we have wrapped alfalfa/orchardgrass balage that we can unroll in the pasture. Since it can be muddy and cold when feeding balage, an option to consider is feeding this in November when the ground is drier and the temperatures are warmer. My hope is that this strategy will save more of the stockpiled fescue until winter and that we will not have to feed as much of the balage in those colder months. Winter annuals such as rye or wheat can provide winter and spring grazing if planted early enough.
I utilize soil samples from all of our pastures and hay fields annually to provide direction for the application of fertilizer and lime. Most fertilizer is applied in the fall when fields are usually dry and fertilizer dealers are not as busy.

In addition to grazing our dairy heifers, we produce alfalfa/orchardgrass hay for sale. There were two barns available to store that hay on the former dairy. We have converted two tobacco barns for additional storage. We raised 70 acres of alfalfa for sale this past year, while using another 80 acres for grazing and haylage. This hay for sale is baled in small square bales for the horse and dairy markets. Hay not meeting this quality is fed to our heifers. We graze our alfalfa in November to gain pasture days and to aid in the control of weevils.

A major challenge to livestock producers is to reduce our reliance on stored feedstuffs by extending the grazing season. In order to do this, we must consider new ways of utilizing traditional crops and think about non-traditional crops. Recently we have used standing corn as fall pasture after we conclude grazing alfalfa on September 15. We have been able to produce good gains with this corn. Small grains such as oats and rye provide good fall, winter and spring grazing. We have tried turnips with the oats. There are many forage species available to producers and various ways to use these forages, but stockpiling fescue has the potential to create the largest impact on our profitability by reducing our reliance on stored feeds for winter. This practice has been proven time and again to provide low cost feed with a minimum of labor.

While I have experience with corn silage, alfalfa hay and cool season grass/clover pastures, I have read about many new forages and new uses for traditional ones. We drilled perennial ryegrass into a thinning stand of alfalfa. We have experimented with turnips and chicory. Our imagination may be the only limit to extending the grazing season.

A Tale of Two Seasons:

The winter of 2004-2005 in our area was one of excess rain and saturated soils. Daily feeding became a challenge due to the mud. “They don’t make boots tall enough!” Getting feed to troughs in pastures was a struggle as was feeding haylage. Higher traffic areas became pugged. The heifers did not gain as they should have. I vowed to make changes that would solve these problems. During this past summer, we installed more geotextile fabric and gravel feeding pads, especially in winter feeding areas. We extended gravel roads to enable us to get to those feeding areas also. It is my hope that future winter feeding seasons will be more successful than last year.

After a mild spring with adequate, but not excessive moisture, we harvested and wrapped a normal first cutting of alfalfa/orchardgrass balage. Soon thereafter, rains became infrequent and the soil slowly began to dry. By July we were becoming concerned about smaller hay yields and slowing grass regrowth. Only the rain produced by Hurricanes Dennis and Katrina saved crops and pasture from complete failure. September and October saw less than an inch of rain each. Our two spring fed water tanks slowed to a trickle. We had to forgo grazing the pastures which were served by these two spring fed tanks even though they still had grass available. Thank heaven for the municipal water which served most of our farm! While neighbors began hauling water to cattle, we were able to keep rotating our heifers and harvesting what grass was still there. The increased forage utilization resulting from MIG was allowing our heifers to continue to gain reasonably well. Other managers had been feeding hay for some time in many cases. The result of continuous grazing was evident. Our pastures, while not lush by
any means, still had some forage available and would have nutrient reserves intact. On September 20, we began grazing corn with our >1000 lb heifers. They gained over 2 lbs per day through October and November. Eighteen acres of standing corn provided grazing for 115 1000 lb heifers for 55 days. We still have 60 acres of stockpiled fescue and wrapped balage to provide for the winter months. Clearly the benefits of MIG were paying dividends in the form of increased forage utilization. These benefits were satisfactory gains and ultimately, a profit.

My challenge to you, then, is to seriously consider the benefits of a Management Intensive Grazing system. The fencing technology is proven and available. Our humid climate and topography are ideally suited to grazing. Our toolbox contains many forage species that we can use to form our own system. A grazing system can also provide a very healthy environment for our livestock. Grazing cattle also provide the benefits of decreased runoff into streams and reduced dependence on fossil fuels and fertilizer, if managed properly. All this can be achieved at a relatively low cost. Best of all, Management Intensive Grazing can provide a very satisfying lifestyle for both man and livestock.
Grazing Preference is dependent on forages available and animals experience

- Desirable
  - Ironweed
  - Ragweed
  - Lambsquarter
  - Sericea
  - Spiny amaranth
  - Pigweed
  - Privet
  - Kudzu
  - Buckbush
  - Multiflora rose
  - Briars
  - Honeysuckle

- Repulsive
  - Fall panicum
  - Yellow foxtail
  - Crabgrass
  - Millet
  - Bermuda

Goats are often referred to as four legged bush hogs and actually they perform best when consuming browse. Goats eat from the top down so fields have a mown appearance even when forage is three feet tall. The typical browse height for goats is up to four foot however, they will rise up on their hind legs and sometimes prop on others backs to reach higher. Goats have an affinity for high quality forage. Much of the vegetation we have considered weeds as beef producers is excellent forage for goats. Goats select the high quality leaves and tender growing tips of woody plants leaving the stem. The leaves and tips of plants are much more digestible and higher in protein and mineral content than the woody, lignified stems of the plant. The long narrow mouth of goats facilitates this grazing habit and allows goats to survive and thrive on generally low-quality pastures and browse plants that would not suffice for cattle or sheep. When goats are your foraging animals, your list of weeds becomes much shorter.
When considering multi-species grazing, goats and cattle have very different preferences for forages. However when forage diversity is not present all species will compete for similar forages. Typically one goat stocked for every cow will not create competition for forage and actually they improve forage for the other species since goats do not prefer grass or clover and cattle do not prefer many of the forbs and browse plants that goats prefer.

**ANIMAL HUSBANDRY AND FORAGE**

Trimming feet, deworming, meningial worm, listeria, are all common disorders that can affect your profitability. Hoofs typically need to be trimmed two or more times per year. In wet conditions hoofs grow faster. Goats on wet soil or in thick wet forage will increase hoof growth and thus the need for hoof trimming. Producers use different techniques to try and reduce hoof trimming. Some pile large rock, others use ramps faced with sandpaper or raised expanded metal to assist in trimming hoofs.

Worms in goats have rapidly become immune to a number of commercial dewormers. Many producers and researchers are very excited about forages with concentrated tannins acting as a natural dewormer. Sericea lespedeza, chickory, and birdsfoot trefoil are a few of the more common species that have high concentrated tannins. Many of the browse species may also have concentrated tannins. Utilizing these forages in a grazing system could be very beneficial.

If a leader follower grazing system is implemented cattle and goats, goats would be the lead animal.

**Goat Requirements for TDN and Protein**

**Forage Quality & Goat Requirements TDN**

<table>
<thead>
<tr>
<th>Pasture Veget.</th>
<th>Pasture Mature</th>
<th>Pasture Dead</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weaning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry &amp; Early Pregnant Does</td>
<td></td>
<td></td>
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<tr>
<td>Yearling</td>
<td></td>
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</tbody>
</table>

**Forage Quality & Goat Requirements PROTEIN**

<table>
<thead>
<tr>
<th>Pasture Veget.</th>
<th>Pasture Mature</th>
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<td>Yearling</td>
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<td></td>
</tr>
<tr>
<td>Dry and Early Pregnant Does</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Forages:**
If voids are present in your forage system consider the following species.

**FORAGE SPECIES**

- **COOL SEASON**
  - Orchardgrass
  - Matua bromegrass
  - Reed Canarygrass
  - Tall Fescue
  - Winter annuals
  - Alfalfa
  - Brassicas (i.e. Rape, Kale, Turnips)

- **WARM SEASON**
  - Eastern gamagrass
  - Big bluestem
  - Indiangrass
  - Crabgrass
  - Pearlmutt
  - Sudangrass
  - Sorghum x
  - Sericea lespedeza
Water Requirements:
Goat’s water requirements are much lower than cattle. Non-lactating goats and weanlings only need 0.5 gal/day, whereas heavy lactating does need 1.5 to 2 gal/day. Fresh clean water is important for goats. Portable water is a practical option for goat producers.

Shelter:
The primary need for shelter is at kidding time and for mature animals during cold wet conditions. Shelter can range from a barn to round rolls of hay placed as a windbreak. Some producers prefer portable shelter because of affordability, nutrient and health management, and due to is lowering the need for cleaning. Wagons can be used but be aware that kids cannot climb into wagons until they are a week or more old. A skirt can be put on wagons for young kids to get under.

GUARDIAN ANIMALS
Predators are a concern particularly with the large population of coyotes now in the area. Another predator that is becoming a growing concern is black headed vultures. People use a number of different guardian animals: miniature donkeys, llamas and dogs are the most commonly used. In our area, guardian dogs are mostly used partially because they are nocturnal which aids in predator control. Some of the more common guardian dogs are: Great Pyrenees, Commodore, and Anatolian Shepard’s. Gelded donkeys or Jenny’s are recommended, not Jack’s.

FENCING
Goats are not as difficult as most people think to control with fencing, especially if a good forage base is available. Goats tend to go under a fence more than jump over it. Fencing is the hurdle that keeps many producers from considering goats. Cattle fences can be retrofitted to control goats. Each type of fence has benefits and short comings. It is often best to use permanent fencing on the perimeter and use portable temporary electric fencing for cross fencing, allocating grazing as needed.

Consider livestock management, handling, watering, shade, feeding and resource impacts when locating fences. Locate watering facility so fields can be cross-fenced with water accessibility.

The minimum number of paddocks recommended is 3 however 5 and even 8 or more paddocks are desirable for:

- Improved parasite control
- Calmer livestock
- Increased Carrying capacity
- Reduced hay fed
- Increased animal gain per acre
- Improved persistence of forages
- Increased forage consumption
- More uniform grazing
- Improved forage utilization
- Higher production
- Better distribution of excreta
- Reduced runoff and erosion
- Improved water quality
- Increased streambank stability
- Improved use of excess pasture as hay
Permanent Fencing:

Non-electric Fencing:

Woven wire

Barb wire

Barb wire, non-electric high tensile, and board fence are not typically recommended however they can be used if two offset high tensile electric wires are run at approximately 8” and 18” off of the ground. Offset wires should be 6” or more from the original fence.

Electric Fencing:

Goats have small feet so they aren’t grounded as well as cattle. However, goats are very sensitive to electricity and respect electric fences once they are properly broke to it. The recommended voltage for control of goats is 4,000 volts or more.

Woven wire is a reliable but expensive form of fencing, place woven wire on the inside of post. No climb horse fence or 4 inch mesh works well for goats. The 6” mesh is sometimes called goat killer wire because goats with horns often get their heads hung in it. The 12” mesh wire works well for mature goats; they typically can get their heads out of 12” mesh wire. Goats tend to walk beside non-electric wire rubbing their side, stretching the wire, lowering the integrity of the fence, thus shortening the fence life expectancy. It is recommended to place an offset electric wire approximately 12” off the ground and 6” or more away from the non-electric fence. The offset wire will stop goats from rubbing on the fence and provide an electric charge for cross fencing.
Training goats to respect electric fencing:
Place goats in a small secure pen (approximately 100 sq. ft. per animal) constructed of non-electric fence such as woven wire, place an offset electric wires 8” and 16” off the ground. Offset wires should be 6” to 10” from the non-electric fence. Leave animals in the area for 5 days or more prior to turning into incrementally larger paddocks.

Recommended Wire Spacing and Charge

<table>
<thead>
<tr>
<th>Wires</th>
<th>Animal Type</th>
<th>Spacing from Ground (Inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Cattle, Sheep, Goats</td>
<td>8, 16, 28</td>
</tr>
<tr>
<td>4</td>
<td>Cattle, Sheep, Goats</td>
<td>8, 16, 24, 32</td>
</tr>
<tr>
<td>5</td>
<td>Cattle, Horses, Sheep, Goats</td>
<td>8, 14, 20, 30, 40</td>
</tr>
<tr>
<td>6-8</td>
<td>Predator Control</td>
<td>6, 12, 18, 26, 34, 44, 56, 68</td>
</tr>
</tbody>
</table>

Typically best to electrify all wires to reduce shorts, during dry conditions every other wire grounded improves shock

Grounding electric fencing:
Proper grounding is the most common problem with electric fences. Grounding systems should be separated by 25’ or more. A minimum of 3 ground rods should be installed for an electric fence charger (energizer). Test voltage of ground rods; if 500 or more volts are present at the ground rod add additional ground rods. Ground rods should be a minimum of 10’ apart.

Lightning protection:
For lightening protection plug the charger into a surge protector, install an induction loop (lightning choke) with a lightening arrestor or spark gap attached to a ground rod system with at least one more ground rod than the charger has. Ground rods of the lightening ground should be 65’ or more from other ground systems.

Install switches on different electric fence lines or paddocks to manage voltage and allow easier maintenance. Short finders are a valuable tool for hard to find electrical shorts. It is recommended to start at the far end of the fence line and test amperage with short finder. Short finders point in the direction of the short. I find it best to start using short finder at the far end of the fence.

Bracing
Bracing is one of the most important components of a fence, all wires are dependent on the brace assembly. Extent of bracing needed depends on number of wires, soil stability, soil depth, and materials used. It’s best if end posts lean 2” to 4” away from the direction of pull. To improve the integrity and life of the fence tie off wires at corners and major dips.

Types of braces recommended:
- H brace – standard good for all types of fence, where the post depth is 36” or more or 30” in concrete
- Double H brace – post depth is 24 to 30”
- Floating brace – good for all fences where post are 36” deep or 30” in concrete. Materials include 6” post with 4” leaning brace with 12.5 gauge wire and tensioner from end of brace to bottom of the post.
- When tying to trees use a 6” lag eye bolt 5/16” diameter, only attach to trees that are expected to live 20 or more years and are low quality timber specimens.
Gates or Gaps
Panel gates are typically best. Electric gaps can also be constructed using recommended wire spacing and connect horizontal wires with a vertical wire every 10’ or so. Three electric handles are typically needed.

Predator Fencing
Predator fencing can be 4” x 4” woven wire with a barb “rust” wire on the ground or buried 2’ to keep animals from burrowing under the fence. High tensile electric wire above woven wire on 6” spacing to the height needed to discourage predator from entering. For general predator control a height of 68” is recommended. See “Recommended wire spacing and Charge” table for wire spacing of high tensile wire.

If only a small area is fenced for predator control night penning is another option to reduce predator problems. Be aware that goats graze at night as well as the day time so night penning will reduce grazing time and animal performance may be compromised.

Temporary Electric Fencing
Several types of temporary fence are available: polywire (9 strand stainless steel is recommended), electro-netwire (poly woven wire with a bottom ground wire and post included), 17 gauge wire (good durable wire but not as user friendly as polywire types). Consider replacing temporary fence with a permanent fence if it stays in one location over 6 months.

SUMMARY
Goats offer many opportunities for producers and land managers. Goats are the species of choice particularly for producers that have early successional growth, “grown up farms”. Improved forage management, improved utilization, less clipping, and more production per acre are all possible when goats are added to the forage management system. Producers need to realize that goats are not simply small cows they require as much or more labor input than stocker cattle. Trimming feet commonly takes a lot of time. Before even considering goats, improved fences, predator control and parasite control are all essential. Have shelter available prior to kidding. Construct a fence that controls livestock and provides peace of mind. For perimeter and primary cross fences construct permanent fence with temporary fencing used for strip grazing or temporary cross fences. An exciting challenge is managing what you once considered weeds as forage.

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MAXIMIZING PRODUCTION OF BEEF CATTLE ON PASTURES

Dr. Justin Sexten
Extension Specialist Animals Systems/Beef
Mount Vernon Extension Center
University of Illinois

Introduction

Standardized performance analysis (SPA) of beef cattle operations continues to demonstrate the importance of reducing feed related costs. As producers look for alternative methods to reduce feed costs the benefits of improved forage management become increasingly important due to the opportunity to reduce feed costs while improving animal performance. One note of caution related to maximizing beef production from pasture, maximizing anything must be done carefully, the difference between maximum success and a total disaster is a fine line.

To maximize beef production from grazing pasture several management practices must be followed, cattle must graze as many days as possible, cattle must graze high quality forage, and harvested forage losses must be minimized. This paper will address these three factors and their role in maximizing beef production from pastures.

Grazing Days

Before proceeding the term grazing day must be defined. Many consider a grazing day to be one animal grazing 1 day. This definition will work if all cows are the same weight, calves are not grazing with cows and you are not comparing your operation to another. The daily grazing pressure applied by a 1400 pound cow, a 1100 pound cow and a 300 pound calf do not represent the same stocking rate, therefore a grazing day should be standardized by weight to make reliable comparisons as changes occur within the operation. A grazing day should represent 1000 pounds of animal weight, using this standard allows beef, dairy, sheep, goat and horse producers to discuss pasture productivity without making conversions.

The mathematical example in Table 1. illustrates the importance of increasing grazing days on daily grazing costs.

<table>
<thead>
<tr>
<th>Pasture</th>
<th>Cost, $ / acre</th>
<th>Grazing days / acre</th>
<th>Cost / day</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>30</td>
<td>90</td>
<td>$0.33</td>
</tr>
<tr>
<td>B</td>
<td>30</td>
<td>120</td>
<td>$0.25</td>
</tr>
<tr>
<td>C</td>
<td>30</td>
<td>180</td>
<td>$0.17</td>
</tr>
</tbody>
</table>

This example suggests management practices extending the grazing season can reduce costs. There are three basic methods used to extend the grazing season, increase forage production, improve forage distribution and improve harvest efficiency.

Increase Forage Production

Increasing forage production can be accomplished in several ways. The most common and perhaps simplest is the application of nitrogen fertilizer to existing pastures. The key to fertilizer application is timing, increased forage production due to fertilization is only useful if current production is lacking or demand exceeds available supply. Spring fertilization of cool season pastures only exacerbates the
problem of excessive spring forage growth whereas a late summer nitrogen application, 60-90 days prior to the end of the growing season, will permit the accumulation of high quality forage suitable for fall and winter grazing. Stockpile grazing offers producers the advantages of increased forage production, extended grazing, and reduced stored forage needs.

Nitrogen fertilization can also be accomplished by incorporating legumes into the pasture. As the cost of commercial fertilizer continues to increase producers should consider using legumes to provide nitrogen to pastures. A grass pasture with 35% legumes will produce as much dry matter as a pasture fertilized with 70 pounds of nitrogen per acre. Legume establishment is a more cost effective N source than commercial fertilizer and lengthens the summer grazing season due to improved summer forage distribution and pasture quality. Legumes generally have deeper root systems and are more tolerant of the warmer, drier summer weather. Pasture quality is improved by legume incorporation due increased protein and lower fiber levels.

**Improve Forage Distribution**

Most pastures in the Heart of America consist primarily of cool season grasses producing abundant spring growth. To maximize the production of beef from pastures, grazing day distribution must be leveled out across the year to match the nutrient needs of the grazing animal. To level out the forage production curve producers must consider the addition of different forage species to the grazing system. Legume addition to grass-based pastures has already been discussed as a way to increase forage production during the summer grazing period. Utilizing warm season forages is another method to increase summer grazing days.

Warm-season forages include perennial species such as eastern gamagrass, indiangrass, switchgrass and the bluestems as well as the annual species of pearl millet, sudangrass and the sorghum hybrids. Incorporating warm-season forages into a grazing system offers graziers two distinct advantages; first, forage production during the hottest and driest portion of the growing season and second the opportunity to give cool-season pastures extended rest periods.

The number of grazing days available from warm-season forages should be considered when deciding on which forages to incorporate into the pasture system. Initially perennial species may seem more cost effective due to reduced annual seeding costs. IL-LIFT data has demonstrated annuals can be cost competitive to perennials by increasing grazing days. Annual pastures can be utilized later into the grazing season because root reserves are not necessary and the final grazing can result in total forage utilization. Another benefit to warm-season annuals is increased land flexibility, pastures can be developed during the growing season and land can be utilized by another enterprise after grazing. This flexibility does have the risk of weather related seeding failures.

Utilizing stockpiled cool season pastures is one method of improving fall and winter forage distribution. Using stockpiled pastures is the best method of extending the grazing season on ground where sod cover must be maintained. In areas where crops are produced and land remains fallow during fall and winter using winter annuals such as spring oats, cereal rye and brassica species can be advantageous to improving forage distribution. Incorporating winter annuals into forage systems further utilizes the fixed land base, aids in leveling the forage production curve across the year and provides grazing opportunities during times when many producers are utilizing stored feed resources.
**Improve Harvest Efficiency**

Increasing forage production and improving seasonal distribution can all be for not if harvest efficiency is low. Harvest efficiency is negatively correlated to length of the grazing period. As grazing period length increases harvest efficiency declines. Cattle allowed continuous access to the same pasture will only utilize 30-35% of the forage produced during the entire year. Conversely strip grazing can permit seasonal harvest efficiencies of 70%. These two contrasting management systems demonstrate the importance of developing a managed grazing system. Simply, moving cattle to new pastures once a week can increase forage utilization by as much as 40%.

Regardless of the harvest efficiency targeted by producers, the “Take half, leave half” principle must be employed to ensure continued pasture productivity. Overgrazing to maximize grazing days may reduce costs in the short term but the difference will be realized in later grazing periods.

**High Quality Forage**

Based on the examples from Table 1. decreasing grazing costs by increasing stocking rate would seem to be the best method to maximize beef production from pasture by improving per acre productivity, however, high stocking rates can depress individual animal performance.

The best method to balance individual animal performance and per acre productivity is to manage pastures for high quality forage. High quality forage is high in protein and low in fiber. Managed grazing systems improve forage quality by reducing animal selection and thus improving the persistence of plants sensitive to close grazing. In addition, forages are more uniformly grazed resulting in more vegetative pastures with less weed pressure and mature plant material.

High quality pastures many times are under utilized by beef producers. Mature cow nutrient requirements can be met using high quality pasture so long as there is sufficient supply. Beef producers could more effectively utilize pastures by grouping cattle according to nutrient needs and utilizing a leader follower grazing system. These systems maximize pasture beef production by providing the highest quality forages to animals with the highest nutrient requirements. Beef management groups may include:

- Young cows
- Heavy milking cows
- Growing and finishing cattle
- Average milking cows
- Developing heifers
- Dry cows

Rotating these management groups through high quality pastures will aid in maximizing pasture utilization.

**Minimize Harvested Forage Losses**

Beef producers may waste more money harvesting excess forage than any other input. Harvesting excess forage as hay is initially as efficient as any other grazing-based harvest method. Nonetheless, from the time excess forage is put into a bale and eventually consumed by the cow a tremendous amount of feed is lost due to storage and feeding methods.

**Storage**

Many factors affect forage storage losses. One of the most important is bale size. When comparing two bales with an equal spoilage depth of 5 inches, a 4 foot diameter bale will experience 40% greater dry matter losses than a 6 foot bale simply due to a greater percentage of the smaller bale contained in the surface layers. The potential for reducing storage related dry matter losses should be addressed prior to baler purchase.
The remainder of storage related forage loss can generally be attributed to storage method and site. The list of poor storage methods and sites is extensive, rather than discuss the losses producers should focus on these keys to effective hay storage:

- Butt flat bale ends together tightly
- Consider covering bale rows
- Leave 3 feet between bale rows
- Make high density bales
- Orient bale rows north and south
- Store hay in bright sunny location, barns are the only suitable dark location
- Store hay on well drained site preferably on stone, pallets, etc.

Minimizing stored forage losses will aid in maximizing beef production from pasture by reducing the cost of excess forage management.

**Feeding**

Feeding losses associated with stored forages can be as great as or greater than losses observed in storage. Given the opportunity, a cow will gladly eat the best forage and sleep on the rest. To minimize forage feeding losses producers should consider restricting access to hay by utilizing a hay feeder or limiting hay access time. Michigan State researchers (Buskirk et al., 2003) compared hay feeder types and concluded round-ring feeders and round feeders with a center cone are most effective in minimizing hay waste compared to square trailer and cradle-type hay feeders.

University of Illinois researchers (Cunningham et al., 2005) reported acceptable cow performance and reduced hay waste and manure production when daily hay access was restricted to 3, 4, 7, 8, or 12-hours compared to 24 hour hay access.

The simplicity of *ad libitum* hay access contributes hay feeding losses. Putting hay out twice a week allows producers to minimize feeding labor and time while potentially maximizing the stored forage requirements of the operation. Taking management steps to minimize storage and feeding losses as well as the need for stored forage will significantly increase the production of beef from pastures.

**References**


Introduction

Numerous forage crops adapted in the Southeast offer benefits in production of various domestic animals including beef and dairy cattle, horses, and sheep (Ball, et al., 2002). Many of the same attributes these plants offer when grown in connection with livestock enterprises are also valuable in wildlife settings. Furthermore, the attitudes of many wildlife managers are changing, and their desire for knowledge of forage crops is on the rise. Consequently, forage crops are becoming more important and more greatly appreciated by wildlife enthusiasts within our region.

Wildlife Enhancement as a Fringe Benefit

Wild animals have always felt free to visit pastures and hayfields anytime they are planted within the geographical area in which they live. In fact, some wild animals even alter their range in order to access certain forage plantings more easily or more frequently. Livestock and hay producers regularly have the experience of seeing birds and animals of many species on their farms. However, the extent to which pastures and hay fields are used by wildlife is almost certainly underestimated by most producers. After all, wild animals are shy and secretive and generally prefer to avoid being near humans. Many are primarily or exclusively nocturnal, and thus are active only at times when humans are not generally present.

In the Sacramento Valley in California, wildlife biologists conducted studies of alfalfa fields to determine the extent of wildlife activity within them. They found that of 643 resident and migratory amphibians, birds, mammals, and reptiles known to occur in that area, 162 species (about 25%) were regularly using alfalfa fields to some extent, and about 10% were using alfalfa fields extensively (Kuhn, et al., 1996).

The use of forage crops by wildlife is not limited to isolated rural areas. While various wildlife species have widely differing requirements, in some settings such as areas in which cities are encroaching on agricultural land, there would be little habitat suitable for many types of wild animals if there were no forage crops present. Thus, enhancement of wildlife can be considered a fringe benefit of forage production by a forage/livestock producer or by the producer’s nearby neighbor who enjoys having wildlife in close proximity to his or her home.

Growing Forage Crops Specifically or Primarily for Wildlife

Wildlife management has evolved greatly in recent years. Twenty-five years ago it was not particularly common practice in the Southeast for plants of any type to be established strictly for wildlife. When such plantings were made, they usually consisted of cool season annuals (often small grain and/or annual ryegrass). These species are relatively easy to establish and require little management after establishment. The main, and often the only, objective for making such plantings was usually to attract
game animals during hunting season in order to increase the likelihood of hunting success.

Things have changed. Today many wildlife managers are quite sophisticated in their approaches. An increasing number are thinking about the long-term implications of management practices, including the importance of striving to provide optimum nutrition throughout the year. There is more awareness that good nutrition can improve the health of wild animals, increase their size and weight, as well as increase wildlife populations. Furthermore, while most plantings for wildlife are still made by hunters or by people who are hired by hunters, there is also increasing interest in non-game wildlife by non-hunters as well as by hunters. Many different species of plants are now regularly planted for wildlife, including some such as alfalfa that require considerable attention to detail for good results (Ball, 2005).

Why Consider Planting Forage Crops for Wildlife?

There are numerous wildlife species as well as many species of forage plants. Not surprisingly, a particular plant species may offer different benefits to various species of wild animals or may be of much more value to some species of wild animals than to others. Hunters are responsible for most wildlife plantings being made, so the emphasis in this discussion will be on benefits to game animals or to hunting enthusiasts. As viewed from the perspective of a wildlife manager, highly desirable traits various forage crops may offer can be put into a few main categories.

*Persistence* - Annuals are often used in wildlife plantings mainly because many annual species offer the advantages of good forage quality and rapid growth. Some annuals can be managed for reseeding, but many wildlife enthusiasts prefer to use perennials when possible.

The expense, the establishment risk, and especially the time and effort involved in regularly planting annuals is something they would rather avoid.

*Nitrogen Fixation* - Wildlife managers like the fact that legumes can symbiotically fix nitrogen in association with *Rhizobium* bacteria. However, in the case of wildlife enthusiasts, appreciation of this unique trait of legumes is not so much due to avoidance of the expense of applying nitrogen, which is often an important incentive for many livestock or hay producers. Rather, wildlife managers are more likely to appreciate legume nitrogen fixation mostly because it means that periodic application of nitrogen is one less management practice to be remembered and accomplished.

*Forage Quality* - The nutritional benefits forages provide to livestock are likewise of benefit to forage-consuming wild animals. Whitetail deer is the wild animal species for which plantings are most commonly made in the eastern United States, and knowledgeable wildlife managers who are interested in deer want to establish plants that produce forage with a high level of digestibility and a high protein content. Plants such as alfalfa that contain high levels of calcium and phosphorus are of special interest because these nutrients are important in antler development (a major selling point to deer hunters).

*Insect Attractant* - Forage crops, especially forage legumes, often can be an excellent insectory. In a study done near Ithaca, New York, entomologists identified 591 insect species in a single alfalfa field (Pimental and Wheeler, 1973). For many species of birds, including game birds such as quail and wild turkey, availability of a good supply of insects is of critical importance, especially when the birds are young. Many bird species also benefit from consuming high quality green leaf material.

*Seed Production* - For many birds including quail, doves, ducks, and wild turkeys, seeds
comprise an important part of the diet. The seed produced by some plants commonly grown for forage such as browntop millet, annual lespedeza, corn, and sorghum are of great value in wildlife plantings. Seed-producing plants other than forage crops that are widely used to enhance bird populations or to attract birds for hunting purposes include sunflower, sesame, Florida beggarweed, ragweed, and proso millet. Also, partridge pea and shrub lespedeza are especially valued because the seed they produce do not weather easily and thus do not deteriorate very quickly over time.

*Long Period of Forage Availability –* Bridging nutritional gaps is of critical importance in wildlife management. The quantity and quality of food available to wildlife can vary greatly. Also, most wildlife species prefer a varied diet, and the relative preference for various plants can vary over time. Thus, having high quality forage and/or an ample supply of seed available over a long period of time is a major advantage.

Ensuring that there will be food available during drought periods or other times when food is less readily available or when wild animals have special nutritional needs is especially important, and the actions of many wildlife managers reflect their awareness of this point. For example, these days many wildlife managers are planting far more than just winter annuals. The reason is that they now realize that while winter annuals have their place, providing high quality forage available during summer and autumn helps ensure adequate milk production by does, increases the likelihood of rebreeding, increases deer weights prior to winter, and favors antler development.

*Potential to Influence Animal Behavior* – In addition to attracting animals to increase the likelihood of hunting success, food plots can be used as a tool to keep wild animals in an area where they are desired (perhaps simply for viewing enjoyment of a landowner). A good example is that wild turkeys, which otherwise may range over a large area, tend to wander much less if chufas are included in food plots. To a degree, wildlife plots can sometimes even be used as a tool to encourage wild animals to stay away from areas where they are not wanted. For example, planting forage species that are highly attractive to deer on a side of a large farm or ranch that is a long way from a well-traveled paved road can decrease the likelihood of collisions with motor vehicles.

*Cover* – Although many native or indigenous plants provide cover for wildlife (which may include nesting habitat for birds) as well or better than many forage plants, this is another benefit to wildlife that can be mentioned. Forage plantings can be especially attractive to small animals such as rabbits, and for young game birds including quail or wild turkeys that simultaneously need cover as well as a high level of nutrition.

**Unique Aspects of Growing Forage Crops for Wildlife**

Site selection is always important in successful establishment of a plant stand, but location of a suitable site for a wildlife planting deserves special mention. Plantings made specifically for wildlife are often located in remote areas, so ease of access with planting and fertilizer application equipment should be a consideration. Though locating plantings close to trees or other heavy cover may provide advantages to wildlife, most forage crops will not be productive in shady areas or in close proximity to tree roots.

Also, wildlife plantings are often made in areas that have not been in regular agricultural production, and thus may need more attention than most sites where forages are planted on farms. Thus, the desirability of planning ahead and starting early to get a food plot in proper condition
(taking soil tests, applying lime, eliminating roots or undesirable plant species, etc.) is especially important. Failure to provide an adequate soil pH and proper soil fertility is a common reason for poor performance of wildlife plantings.

Most other agronomic considerations associated with establishing plantings for wildlife are the same as for growing forages for livestock. For example, the species planted should be suited to the soil type and site. In addition, lime will usually need to be applied several months before planting to raise the soil pH to a suitable level, any needed fertilizer nutrients should be applied in accordance with a soil test, the seed should be planted at the proper time, rate, and depth, etc.

Although a wildlife enthusiast will be pleased with a beautiful, thick forage stand, stand density is actually not as important in wildlife plantings (especially in older stands) as is the case when plantings are made for livestock or for hay production. Although mowing to reduce shading or applying an herbicide may sometimes be desirable, as long as volunteer grasses or broadleaf plants are not offering excessive competition, in many cases it is not particularly harmful to have such plants growing along with forage crops in a wildlife situation.

If the nutritional needs of forages are met and excessive competition from volunteer plants is prevented, the life of a perennial forage planted for wildlife can be as long, and may even exceed, that of a planting made for livestock. Although wildlife populations vary greatly, in wildlife plantings there may be less season-long defoliation stress than occurs when forage crops are planted for hay or to provide pasture for livestock. Also, with a planting of a perennial forage crop made specifically for wildlife, there is usually less urgency about making a decision to replant if stands begin to thin. A fairly low percentage of a good quality perennial forage crop in a mixture with volunteer species may make a perfectly acceptable wildlife food plot.

Although many plants commonly established for wildlife are forage crops, some are not. Chufa, Japanese honeysuckle, sawtooth oak, Florida beggarweed, partridge pea, sesame, ragweed, and sesbania are examples of plants that are not normally planted for livestock. Thus, if a forage-oriented person becomes interested in growing plants for wildlife area, it behooves him or her to learn about the advantages, disadvantages, and management of these and other non-forage plants commonly grown for wildlife but not for livestock.

Final Thoughts

There has long been much interest in wildlife among a significant portion of the human population, and wild animals have always benefited from forage plantings made for livestock. However, interest in planting forage crops primarily or specifically for wildlife is clearly on the upswing at present. Wildlife managers are becoming more knowledgeable about the nutritional needs of wild animals, and they are increasingly willing to exercise a higher level of management and to use more sophisticated approaches to meet those needs.

References


I am not an expert on this subject and give all credit for my limited understanding of this subject to Dr. Fred Provenza, Utah State University; Katy Voth, Livestock for Landscapes, LLC; Jim Gerrish and others. I have tried to put into practice, both personally and with other producers, many of these principles to aid in improved grazing management. This presentation will address only 2 aspects of animal behavior; 1) How animal behavior impacts grazing distribution and forage utilization over the landscape, and 2) How animal behavior affects diet selection.

**Impacts on grazing distribution/forage utilization over the landscape**

Most, if not all, of the grazing animals that we work with evolved as herd animals. The herd mentality developed as a means of protection, safety in numbers. Herd animals like to stay in close proximity of their herd mates for protection. This instinct can have an effect on the grazing distribution and utilization of the overall pasture. When some of the animal’s basic needs such as shade, water, salt and/or minerals are located some distance away from where the animals are grazing, they will travel as a herd to these areas. This reduces the herd’s ability to uniformly graze throughout the entire pasture. Conversely, if all of these basic needs are in close proximity to each other, it can cause the herd to camp out in this area for an extended period causing overgrazing, reduced plant vigor, increased soil erosion, increased weed invasion, soil compaction, increased pollution potential from runoff and degraded wildlife habitat. Research at the Forage Systems Research Center in Linneus, Missouri shows that as travel distance to water increased above 800 feet, then the animals traveled as a herd to water and utilization of the pasture beyond 800 feet was greatly reduced. When travel distance to water is kept below 800 feet then the animals normally drink individually or in small groups and resume grazing across the pasture. Subsequent research shows the effect that water location, shade and paddock size have on grazing distribution and manure distribution. Pasture utilization is affected by the length of the grazing period and stock density. Grazing period is the length of time grazing animals are in any one pasture. The longer grazing animals are in a pasture the lower the utilization rate will be. This is due to the animal’s ability to selectively graze choice plants and new regrowth while letting others go to maturity and desiccation. Losses due to trampling, soiling, manure and urine are greater with longer grazing periods. When pastures are sub-divided into smaller units, stock density increases and grazing period length decreases. As stock density increases this decreases the animal’s ability to selectively graze due to competition from herd mates. As grazing period length and selectivity are decreased, pasture utilization is increased.

**Effects on diet selection**

Grazing animals have the ability to select a higher quality diet than the average for the pasture. This is due to the animal’s ability to select particular plant species, individual plants and plant parts to eat. Selection is driven by: 1) Availability; 2) Palatability; 3) Differential access due to plant growth form;
and 4) Habit and experience. Each of these four factors will be discussed in more detail.

Availability

Dry matter intake on pasture is based 75% on availability and 25% on forage quality. The reason availability is so important is due to the mechanics of grazing. Intake is driven by: time spent grazing; biting rate; and bite size. Grazing animals spend 6 – 10 hours per day grazing. During this time they can only take so many bites per minute. Cattle generally take 30,000 to 50,000 bites per day. This seems like a lot but it is still a limited number. There is quite a difference in intake between 50,000 mouthfuls and 50,000 small bites. The only thing that we as managers can regulate is bite size. To maximize intake each bite needs to be a mouthful. Research shows that for animals to reach potential intake, 1800 – 2400 pounds of forage dry matter per acre should be on offer. In our cool season grass/legume mixed pastures this equates to approximately 6 – 8 inch tall pasture sward. This would give a good bite size of high quality forage. Conversely, animals forced to graze on 2 inch tall pasture will be limited on intake due to bite size.

Palatability

Palatability also drives diet selection. Palatability is often defined as pleasant tasting, but research by Dr. Fred Provenza shows that palatability is more than a matter of taste. Palatability is determined by post-ingestive feedback interrelationships between nutrients, toxins and flavor. Animals associate a particular flavor to either a positive or negative post-ingestive feedback. All plants contain differing levels of nutrients and toxins. Some common plant species that contain toxins include:

<table>
<thead>
<tr>
<th>Toxin</th>
<th>Plant Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyanide compounds</td>
<td>White clover, Sudan grass, Johnson grass, Chokecherry, Serviceberry</td>
</tr>
<tr>
<td>Alkaloids</td>
<td>Reed canarygrass, Bindweed, Jimsonweed</td>
</tr>
<tr>
<td>Fungal endophytes (ergot alkaloids, ergovaline)</td>
<td>Tall fescue, Perennial Ryegrass</td>
</tr>
<tr>
<td>Nitrate</td>
<td>Oats, Wheat, Rye, Pigweed, Sweet clover, Alfalfa, Sudangrass</td>
</tr>
<tr>
<td>Tannins and phenolic compounds</td>
<td>Birdsfoot trefoil, Serricea lespedeza, Crown Vetch, Walnut, Oak</td>
</tr>
<tr>
<td>Terpenes</td>
<td>Juniper, Pine, Bitterweed</td>
</tr>
</tbody>
</table>

Palatability operates along a continuum to influence preferences. When nutrients are eaten in proper amounts the post-ingestive feedback is positive and the animals develop a liking for the flavor. However, when animals overingest either nutrients or toxins a negative post-ingestive feedback occurs and they develop a dislike or aversion to the flavor. Aversions can be strong or mild, long lasting or short-lived depending on the severity of the post-ingestive feedback and other factors we will discuss later. Nutrient and toxin concentrations limit the amount of feed an animal can ingest. Excesses or deficits of nutrients decrease palatability. Animals show little preference for foods low in nutrients and eat limited amounts of foods too high in nutrients. Excess protein reduces palatability and intake because of an increased production of ammonia. Excess energy can cause acidosis which reduces palatability and intake.

Animals like variety in their diets. Variety in the diet helps reduce the chance of overingesting toxins. Diversity or variety also helps meet the nutritional needs. Different types of plants supply differing levels of protein, energy, minerals and vitamins. Animals can develop aversions to foods when they become satiated on that particular food flavor. Providing animals
with a variety of foods (diversity) may provide animals with a more balanced diet, increase intake, decrease stress and increase efficiency.

**Plant Growth Form/Physical Attributes of Plants**

Grazing animals must deal with plant physical characteristics such as standing dead material in some grasses, thorns in some forbs and woody plants, leaf size, and plant canopy shape and structure. These physical features can facilitate or inhibit foraging and increase or decrease intake. Some animals such as goats and sheep with their small mouths and prehensile lips have the ability to select the most desirable parts of plants. Cattle on the other hand, with their large rumen capacity can handle more volume and thus can digest lower quality material. Any combination of plant physical and nutritional characteristics that optimizes intake will be a preferred food.

**Habit and Experience**

Research indicates that animals learn which plants to eat and which to avoid through three avenues: watching mothers, interacting with peers, and reinforced through personal experience. Young animals learn about every facet of their environment from socializing with their mothers. As young animals begin to forage, they quickly learn to eat the foods mother eats and they remember those foods for years. Research also shows that a mother can help reduce her offspring’s risk of eating toxins. If a mother avoids harmful foods the offspring will also avoid ingesting those foods in any large quantity. Young animals acquire preferences for foods its mother eats and aversions for foods she does not eat. This training from mom is further reinforced by personal experiences. If the young animal eats a plant that mom avoids and later has a negative post-ingestive feedback, then a more definite aversion to that food is formed.

As young animals grow older they interact increasingly with their peers. Peers become a major influence on each others behavior. Young animals encourage one another to try new things. Each young animal may have different past learning experiences. Socializing enhances the learning efficiency of the group. Each individual animal no longer has to discover everything by itself.

Animal behavior is a function of consequences. Consequences come in two forms – reinforcement and punishment. Behavior results from various combinations of these consequences. Consequences that increase the probability of a behavior are called reinforcement and they can be either positive or negative. By nature, animals seek positive reinforcement and avoid negative reinforcement. Consequences that decrease the probability of a behavior are called punishment. Positive punishment is based on the presence of positive aversive stimuli, such as an electric fence shock. Negative punishment is based on the removal of a positive re-inforcement, such as when an animal eats a plant that was once nutritious but is no longer nutritious. They no longer receive positive post-ingestive feedback and decrease the occurrence of this behavior. There is a growing movement away from the use of negative reinforcement and punishment and towards the use of positive reinforcement. Positive punishment often times arouses anger and fear. Whereas the removal of positive stimuli of leads to disappointment or depression. This happens when animals are removed from familiar environments and placed in unfamiliar environments. Performance is poor and stress is high because all familiar positive reinforcements have been removed. Behavior is better developed by positive reinforcement than by negative reinforcement or punishment. A combination of positive reinforcement and punishment or negative reinforcement may
be the most effective means to change a particular behavior. Through punishment (electric fence, removal of nutrients or addition of toxins), animals can be trained to avoid palatable plants. However, the aversion may not be long lasting unless the animals are given access to nutritious alternatives (positive reinforcement). For training to be most effective, it's not enough to simply discourage unwanted behavior. Animals also need to be encouraged to change behavior.

By using the information of how animals choose foods, they can be trained (taught) to eat unfamiliar and/or less preferred foods by creating a positive reinforcement. Animals can also be trained to avoid preferred foods by creating an aversion through negative reinforcers, positive punishment or negative punishment. Kathy Voth, Livestock for Landscapes, LLC, has developed a 7 step process for training animals to eat unfamiliar foods. This process has been used to train animals to eat foods such as weeds that they normally wouldn't eat. Below is a summary of the 7 step process:

1. Know your plants.
   a. Know what toxins they contain
   b. Know their nutritive value
2. Choose your animals to train
   a. Younger animals are more likely to try new things
   b. Females will tend to teach offspring
3. Maintain a healthy herd
   a. Healthy animals can handle toxins better
4. Reduce the fear of new things
   a. Feed a series of unfamiliar, nutritious foods to produce positive post-ingestive feedback.
   b. Use familiar feed tubs or troughs
5. Make the unfamiliar seem familiar
   a. Add the novel plant to the familiar feed and feeder
6. Field test your animals
   a. Pasture size is critical
      i. Too large and animals can be selective
      ii. Too small and they may not be able to adequately mix toxins and nutrients
7. Observe and adapt
   a. Monitor and make adjustments in pasture size, timing and duration of grazing

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Grazing Programs: Environmentally Friendly, Economically Sound and Agronomically Feasible

Sid Brantly
NRCS
Lexington, KY

The environmental soundness of our farms is the greatest, long term asset that farmers have. The topsoil, the trees, the cattle, the grass and crops on your farm are like unto a great financial account...and you are the banker. You make the decisions to: A) Use it all up now, B) Lock it away for someone in the future to make the decisions, or C) Utilize wisely in such a way that it is managed for financial success today, and still builds momentum for your future as well as your descendents.

The environment in the heart of America has been carefully engineered and crafted so that you can be successful in 2006 and beyond. Generally, it takes a partnership between you and the landscape. And, since the environment is shared by many people, there are opportunities to also partner with groups, or even the public at large.

Individual counties, state government conservation divisions, environmental groups, wildlife groups, sometimes even private hunting groups, as well as the national Department of Agriculture sponsor opportunities to share the burden of conservation costs when they exceed what you or I desire to handle alone. Here are a few cost sharing programs that we will examine today:

- Environmental Quality Incentives Program (EQIP)
- Wildlife Habitat Incentives Program (WHIP)
- The Grassland Reserve Program (GRP)
- Conservation Security Program (CSP)
- The Conservation Reserve Program (CRP)

But first and foremost, do any of these programs have what it takes to help you build or maintain a successful grazing management program in the heart of America? As a successful grazier today, and to manage a sustainable operation for the future, you will benefit from: 1) Competitive Advantage, 2) Marketing Skills, 3) Records, and 4) Low Cost Production.

Competitive Advantage Has Become Important
Commercial beef production systems put you in a “matured market” system. If you don’t have a limited supply, unusual, or niche market to work with, then you need competitive advantage. We accept the price that supply and demand principles offer us. Broader experience in marketing can lead to increased options in selling and buying livestock.

Marketing Skills
Developing marketing skills and management expertise in preconditioning calves (certified), retained ownership, joint ventures, establishing yourself in marketing alliances can give heart of America producers more alternatives for selling grazing land products.

Records
Records allow us to predict where we are going, and map out a possible strategy for change. Livestock management and production records are necessary for a successful grazing program, but have you considered grazing management records?
Figure 1, (first graph above) records a producer’s past forage demand modeled for 42 mature pairs and 2 bulls; coupled with forage from 64 acres orchardgrass/fescue/red clover, 9 acres alfalfa, 6 acres big bluestem, and 6 acres eastern gamagrass.

Figure 2 (second graph above) models the same farm with an intensive grazing system, the same brood herd, and 30 heifers (some held over, some purchased) sold as bred heifers in August and early September.
Grazing management records are important in order to predict the environmental costs and forage production for subsequent years. As such, the Conservation Security Program requires 2 years of grazing management records in order to be enrolled in the program.

4. Low cost production
We can neither starve cattle fat nor spend ourselves rich. Thus, low cost production is still the name of the game for the long term. In large part, that amounts to getting more, low-cost, quality forage through our animals, matching their requirements for optimum production. The hands down winner always centers around harvesting forages directly with the grazing animal. When you have to handle it or process it yourself, you lose competitive advantage.

Before we can graze it, we have to grow it. Obviously, there’s a plethora of agronomic issues for growing forages (plant adaptability, soil amendment/fertilization needs, nitrogen fixation, anti-quality factors) that must be addressed. But even when these needs are met, most of us do not grow as much forage as we could; and I’m convinced that the primary reason relates to Figure 3 below.

![Graph showing available forage, lb/ac (20% DM) vs. fast and slow growth period in days]

**FIGURE 3.** (from “Practical Applications of Plant Physiology” M.Goodman)

As forages recover from grazing periods, and the leaf surface area increases, the growth rate increases dramatically. If the grazing animals are still in the pasture when the forage plants bolt into fast growth, the animals will re-graze the same plants, thus ending the opportunity for significant growth. Pastures that are continuously grazed cannot be as productive as those with short grazing periods and relatively long recovery periods.

For example, Hoveland, McCan and Hill reported a 37% increase in total calf gain per acre, as well as a 31% decrease in hay requirements, based solely on rotation grazing versus continuous grazing.
Optimum recovery period varies between forage species, but consider Orchardgrass and Tall fescue and Alfalfa to need about 15 days when growing fast, and up to 30 days when growing slowly. Red clover needs 10 days rest in the fast growth stage, and 20 days in the slow growth period, while native warm season grasses benefit most from 30 days rest when growing quickly, and 40 to 45 days rest when growing slowly.

Rotational grazing is simply a method of grazing management to capitalize on the increased production of forages when regular recovery periods are built into your farms grazing program. The grazing system that provides for these increased production levels also assists in building strong, deep, fibrous root systems that provide a level of drought protection for your farm. The overall ecosystem improvement provides for less erosion on the farm, cleaner water, and improved viewsheal and environment for the public at large. The programs available to stock farmers in the heart of America are aimed at helping expedite the application of good grazing management.

Let's examine a handful of the programs available throughout the heart of America to see if you can profit from any of them. When investigating programs on this scale, or locally, first determine if the benefits are agronomically feasible for incorporating on your farm. It has to fit your landscape, your production goals, and be sustainable for the foreseeable future. If it meets this feasibility test, then see if the program is financially and economically sound (remember, many practices may have a positive economic output in the long run, but cash flow is the driving force behind most bankruptcies.

Environmental Quality Incentives Program (EQIP) offers contracts with a minimum term that ends one year after the implementation of the last scheduled practice. EQIP can provide cost share or incentive payments to implement conservation practices such as prescribed grazing, water developments, grazing distribution improvement fences.

Wildlife Habitat Incentives Program (WHIP) provides technical and financial assistance to establish and improve fish and wildlife habitat. WHIP agreements generally last from 5 to 10 years.

The Grassland Reserve Program (GRP) offers landowners the opportunity to protect, restore, and enhance pastureland while receiving an easement payment or annual rental payments. Offers for enrollment must generally contain at least 40 contiguous acres.

Conservation Security Program (CSP) supports ongoing stewardship of private agricultural lands by providing payments for maintaining and enhancing natural resources. CSP sign-up is offered in select watersheds.

The Conservation Reserve Program (CRP) provides for grazing management with wildlife concern calendar restrictions and a 25% rental payment reduction. Continuous signup CRP is available for grassed waterway installations, riparian buffers, field borders, and filter strips.

Environmental benefits from grazing programs can only be derived when the components of the program are economically sound and agronomically feasible. Each farm is unique in its needs for environmental improvement, but nearly all have a potential to be made better. Plan your grazing program accordingly.
Tall fescue is the most important cool-season grass grown in the “Heart of America”. It is a versatile plant used for animal feed, lawns and turf, and conservation purposes.

Tall fescue is a native of Europe. The exact date of its’ introduction into the United States is not known, but likely came as a contaminant in meadow fescue seed from England prior to 1880 (Table 1). Tall Fescue was an entry in the National Herbarium Collection in 1879 and was grown in plots in Utah, Kentucky and Maryland (USDA) in 1880. In 1916, tall fescue plants were identified in Pullman, Washington with some of these plants taken to Corvallis, Oregon in 1918. Selections out of this initial planting was released in 1945 as the variety Alta.

FARM VISIT – The most important farm visit in the history of Kentucky agriculture occurred in 1931 when Dr. E.N. Fergus, an agronomist with the University of Kentucky, was invited to Menifee County to judge a sorghum syrup show. Following the field day, Dr. Fergus visited a hillside farm owned by Mr. W.M. Suiter. Dr. Fergus observed an excellent stand of grass growing on a steep hillside. The grass had been growing in the field for over forty years. Dr. Fergus identified the grass as tall fescue and took a few pounds of seed back to the University for testing. After lengthy testing, it was released in 1943 as the variety “Kentucky 31”. It now occupies over 35 million acres in the Southeastern USA.

<table>
<thead>
<tr>
<th>Table 1. Tall Fescue: At a Glance</th>
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<tbody>
<tr>
<td>Year</td>
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<td>Pre 1800</td>
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<td>1940’s-50’s</td>
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<td>1950’s &amp; 60’s</td>
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<td>1950’s-70’s</td>
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<td>1973</td>
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<td>2005</td>
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<td>2006</td>
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FARM VISIT 2 – A second historic development involved cattle herds grazing separate tall fescue pastures on the A.E. Hays farm near Mansfield, Georgia. Only one of the herds exhibited fescue toxicity symptoms. Dr. Joe Robbins and Dr. C.W. Bacon, USDA, Athens, Georgia, began searching for an explanation for this situation in 1973. Finally, in 1976, the toxic pasture was found to be 100% infected with an endophytic fungus, while the non-toxic pasture was less than 10% infected. This implied an association between the endophyte and fescue toxicity.

Endophyte Impact Documented – A third development involved a grazing experiment initiated in the mid-1970’s at Auburn University. Dr. Carl S. Hoveland and co-workers noted marked differences in the appearance and gains of steers grazing newly-established paddocks of tall fescue on the Black Belt Substation near Marion Junction, Alabama. Ultimately, it was found that there was no fungus infection in paddocks where performance was good, but a heavy infection in paddocks producing poor gains. Thus, the association of the endophyte with poor performance of cattle was documented in a replicated, controlled grazing experiment (Table 2). It is believed that some paddocks were endophyte-free because they had been established with old seed in which the fungus had died prior to planting.

<table>
<thead>
<tr>
<th>Tall Fescue Pasture</th>
<th>Animal Days/acre</th>
<th>*Beef Gain (lbs/ac)</th>
<th>Avg. Daily gain (lbs)</th>
<th>Gain/steer (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-infected</td>
<td>240</td>
<td>426</td>
<td>1.82</td>
<td>318</td>
</tr>
<tr>
<td>Fungus-infected</td>
<td>311</td>
<td>301</td>
<td>1.00</td>
<td>185</td>
</tr>
</tbody>
</table>


Endophyte Free Varieties

Once the endophyte had been documented as the “problem”, the obvious solution was to develop a variety without the endophyte (endophyte-free). That process was not difficult or terribly time consuming and by the early 1980’s, Triumph was released from Auburn University, Johnstone from the University of Kentucky, followed by several varieties from both university and private breeding groups.

Endophyte-free varieties were planted on many acres and in several experiments/demonstrations. Experimental results, along with farmer experience, showed excellent animal performance once the endophyte was eliminated; however, it was also learned that the endophyte had provided the tall fescue plant considerable “protection” enabling the old Kentucky 31 endophyte infected to be very persistent and resistant to many environmental, pest, and management stresses including overgrazing. As a result, most endophyte-free varieties did not persist well and were not popular among farmers as a “solution.”

Need for a GOOD Endophyte

With full knowledge that the endophyte was the major causative factor in poor animal performance of tall fescue and the fact endophyte-free varieties were not as tough and as persistent as needed, thoughts then turned to a “new solution.” The need for a “good” endophyte – an endophyte that would permit positive animal performance along with stress tolerance of the plant seemed to be an academic “pipe dream” until Dr. Gary Latch in New Zealand identified, isolated, and tested several endophytes and indeed found some that would give that win-win situation. Dr. Latch selected the best endophyte from his program in New Zealand and entered a cooperative research venture with Dr. Joe Bouton, Tall Fescue Breeder at the University of Georgia. The research team inserted the best endophyte into the best tall
fescue variety in Dr. Bouton’s program and
indeed produced a novel endophyte variety
that gave animal performance equal to the
same variety without an endophyte and
permitted the plant to be more stress
tolerant, similar to the same variety with the
“toxic” endophyte. Marketing rights to this
variety was obtained by Pennington Seed
Company and released in 2000 as the
variety Max Q Tall Fescue.

Since the release of Max Q Novel
Endophyte Tall Fescue in 2000, over
200,000 acres have been seeded in over 35
states in the USA and at least six different
countries.

Other varieties are being developed and
tested and will be available in the future. In
addition, other management strategies are
also being investigated.

The endophyte of tall fescue is a very
serious problem for the livestock industry.
This organism is costing the beef cattle
industry over $1 billion dollars annually.
Our challenge is to utilize the best research
information, management practices and
proven products to reduce the economic
impact of this “fungus” to our livestock
industry.

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Website addresses

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MINERAL SUPPLEMENTS AND FEED ADDITIVES – CAN THEY ELIMINATE FESCUE TOXICITY?

John Thomas Johns  
Beef Cattle Extension  
University of Kentucky

Fescue is the predominate cool season grass in much of the United States due to its wide adaptation and hardiness. Many of these acres however, contain an endophytic fungus resulting in production of toxins with negative effects on grazing cattle. The two primary responses in beef cattle are an increase in core body temperature and a decrease in dry matter intake. As a result, decreases in reproductive rates, milk production, weaning weights and ADG are seen (Tables 1 and 2). Many approaches to pasture management have been advocated to overcome or minimize the problem such as incorporation of legumes, rotational grazing, establishment of endophyte free stands or use of friendly endophyte varieties of fescue. While all of these can be beneficial, substantial investment and time is required and success is not guaranteed. Direct application of a compound or product to the animal that alleviates symptoms is the method most preferred by producers. Supplementation of several products have been advocated in recent times to assist in overcoming fescue toxicity. Each will be examined in this paper.

<table>
<thead>
<tr>
<th>Table 1. Effect of Endophyte on DMI and Gain of Grazing Steers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dry Matter Intake, lbs</strong></td>
</tr>
<tr>
<td>Yr. 1</td>
</tr>
<tr>
<td>E. Free</td>
</tr>
<tr>
<td>E. Infected</td>
</tr>
<tr>
<td>USDA – Ga. Yr. 1 = 168 days, Yr. 2 = 98 days</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2. Endophyte and Cow – Calf Performance, 3 yr. Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>% Pregnant</strong></td>
</tr>
<tr>
<td>65</td>
</tr>
<tr>
<td>Weaning Weight, lbs</td>
</tr>
<tr>
<td>Ky. Progress Report 306, p. 25</td>
</tr>
</tbody>
</table>

A common theme in the industry is that supplementation of certain essential trace minerals will assist in overcoming problems of the endophyte in cattle. Indeed, there is some research that indicates a difference in copper status of cattle on endophyte free vs. endophyte infected fescue. However, there is little if any, direct evidence that trace mineral supplementation will alleviate fescue toxicity. None the less, many companies market mineral formulations implying assistance with fescue problems and producer testimonials often indicate better production after using these products. To understand why this might be, we need to compare beef cow requirements of
selected trace minerals to the composition of fescue (Table 3). It is apparent that fescue is deficient in the important trace minerals copper, selenium and zinc. It appears to be adequate in manganese but when availability is taken into account (Table 4) we see that it is inadequate in this trace mineral as well. All of these trace minerals are essential for adequate immune function, reproduction and growth. Thus it is easy to understand that performance might indeed be improved when a higher quality mineral is provided to cattle but it has nothing to do with overcoming the endophyte, only with supplying essential nutrients that were previously inadequate.

| Table 3. Beef Cow Requirements vs. Fescue Content of Selected Trace Minerals |
|-------------------------------|-------------------|
|                               | Requirement, ppm | Fescue Content, ppm |
| Copper                        | 10               | 6                  |
| Selenium                      | .1 - .3          | .06                |
| Zinc                          | 30               | 19                 |
| Manganese                     | 40               | 119                |
| Cobalt                        | .1               | .2                 |
| Iron                          | 50               | 100                |

Mineral content of fescue taken from CHAPA, 1996

| Table 4. Availability of Selected Minerals from Forage |
|-----------------------------|-------------|
|                             | % Available |
| Calcium                     | 50 – 68     |
| Magnesium                   | 10 – 45     |
| Phosphorus                  | 65 – 70     |
| Copper                      | 5 – 15      |
| Selenium                    | 28 – 32     |
| Iron                        | 30 – 70     |
| Manganese                   | 3 – 4       |

Much work has been done with supplementation of concentrates, by-products and other compounds in an effort to overcome fescue toxicity. For grains and by-products, the premise is that by providing other feeds, the toxic effects can be diluted and the negative animal response will be lessened. A study showing the effects of corn supplementation to steers grazing infected fescue is shown in Table 5. The first incremental increase of corn provided for a significant increase in performance while additional increments provided for no or small increases in performance. This data illustrates a problem with attempting to dilute the endophyte effect with grains or starch containing products. Grains introduce significant amounts of starch into the rumen. Starch digesting bacteria lower rumen pH, forming a more acidic environment in which fiber digesting bacteria cannot exist well. Thus as additional grain is added, pasture digestibility decreases resulting in fewer available nutrients from the grass. The first increment of grain may increase performance through a dilution, increased energy intake or combination of both, additional increments provide too much starch and although diluting the endophyte, offset that effect with a greater negative effect on pasture digestion.
Several by–product feeds are available that are low in starch and high in digestible fiber such that they perform much like a high energy feed when supplemented. Two commonly available products are corn gluten feed and soybean hulls. Results from trials comparing these products to corn supplementation on endophyte fescue in Kentucky, 1995 are shown in Tables 6 and 7. Steers fed 6 pounds of either corn or corn gluten feed had improved gain over the non-supplemented controls. However steers supplemented with gluten had a significantly greater improvement in gain compared to the corn supplemented. In the trial comparing supplementation of soybean hulls to a corn – soybean meal mixture, steers receiving the soybean hulls gained .4 pounds more per day on stockpiled fescue compared to the corn – soybean meal supplemented cattle. In both of these trials the by – products provided a dilution effect without any negative effects on pasture digestion. If producers wish to provide concentrate supplementation to dilute the effect of the endophyte, low starch containing by – product feeds rather than grains should be used.

<table>
<thead>
<tr>
<th>Table 5: Corn Grain Supplementation to Steers Grazing Fescue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lbs of Corn</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>1.4</td>
</tr>
<tr>
<td>2.8</td>
</tr>
<tr>
<td>4.2</td>
</tr>
</tbody>
</table>

Several by – product feeds are available that are low in starch and high in digestible fiber such that they perform much like a high energy feed when supplemented. Two commonly available products are corn gluten feed and soybean hulls. Results from trials comparing these products to corn supplementation on endophyte fescue in Spring or on Fall stockpiled fescue are shown in Tables 6 and 7. Steers fed 6 pounds of either corn or corn gluten feed had improved gain over the non-supplemented controls. However steers supplemented with gluten had a significantly greater improvement in gain compared to the corn supplemented. In the trial comparing supplementation of soybean hulls to a corn – soybean meal mixture, steers receiving the soybean hulls gained .4 pounds more per day on stockpiled fescue compared to the corn – soybean meal supplemented cattle. In both of these trials the by – products provided a dilution effect without any negative effects on pasture digestion. If producers wish to provide concentrate supplementation to dilute the effect of the endophyte, low starch containing by – product feeds rather than grains should be used.

<table>
<thead>
<tr>
<th>Table 6: Supplementation and Gain of Steers Grazing Endophyte Fescue in Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
</tr>
<tr>
<td>ADG, lbs</td>
</tr>
</tbody>
</table>

JAS 76:1691-1701, Supplements fed at 6 pounds per head daily

<table>
<thead>
<tr>
<th>Table 7: Supplementation and Gain of Steers Grazing Stockpiled Endophyte Fescue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplement</td>
</tr>
<tr>
<td>Weight, lbs</td>
</tr>
<tr>
<td>Supplement Intake, lbs</td>
</tr>
<tr>
<td>ADG, lbs</td>
</tr>
</tbody>
</table>

KY. PR-417, p. 86

Additional compounds that have shown some promise of effectiveness in controlling fescue toxicity are also available. A microbial product, FEB – 200 has shown positive effects on cow – calf production, Tables 8 and 9. Cows receiving 20 grams daily of the product in a free choice mineral lost less weight, weaned heavier calves and rebred at much higher rates than control cows without FEB – 200. Data in Table 9 also shows improved calf gain and weaning weight when cows were provided FEB –
200 in one pound of corn daily. The corn alone provided no benefit so the effect is not one of enhanced nutrition but of some direct effect of the product on overcoming the negative effects of the endophyte.

Table 8. Effect of FEB – 200 in a Free Choice Mineral on Cow – Calf Productivity

<table>
<thead>
<tr>
<th>Treatment</th>
<th>FEB – 200</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cow Weight Change, lbs</td>
<td>-34</td>
<td>-90</td>
</tr>
<tr>
<td>% Pregnant</td>
<td>97.8</td>
<td>88.9</td>
</tr>
<tr>
<td>Weaning Wt. lbs</td>
<td>634</td>
<td>606</td>
</tr>
</tbody>
</table>

20 grams/head/day for 170 days, MO 2002


<table>
<thead>
<tr>
<th>Treatment</th>
<th>FEB – 200</th>
<th>Control</th>
<th>Corn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calf ADG, lbs</td>
<td>2.09</td>
<td>1.98</td>
<td>1.93</td>
</tr>
<tr>
<td>Weaning Wt. lbs</td>
<td>512</td>
<td>497</td>
<td>490</td>
</tr>
</tbody>
</table>

JAS 81(Supplement 1):168

Tasco is an extract of brown seaweed shown to have antioxidant properties. It is known to improve immune response in stressed cattle and could cause a favorable response in cattle with fescue toxicity. Field trials or testimonial response indicate a favorable effect of the product but little scientific literature exists to verify the effects, Table 10.

Table 10. Effect of Tasco on Steers Grazing Endophyte Fescue

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Control</th>
<th>Tasco</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gain, lbs</td>
<td>Trial 1</td>
<td>Trial 2</td>
</tr>
<tr>
<td></td>
<td>Trial 1</td>
<td>Trial 2</td>
</tr>
<tr>
<td>Trial 1</td>
<td>108</td>
<td>120</td>
</tr>
<tr>
<td>Trial 2</td>
<td>225</td>
<td>214</td>
</tr>
</tbody>
</table>

Trial 1 = Tasco literature, 60 days of grazing
Trial 2 = JAS 79:1022 – 1031, 166 average grazing days

MIX – 30 is a liquid, high fat compound made from corn oil and by – products of the corn milling industry. High fat products have been shown to improve reproduction in nutritionally stressed cattle. An experiment was conducted at Kentucky to compare the effects of feeding MIX – 30 or similar energy and protein levels to cows with nursing calves and grazing endophyte fescue without shade. The MIX – 30 was made available twice weekly for free choice consumption. A corn – soybean meal mixture was fed daily to a second group of cows to supply equal ME and crude protein intakes as the MIX – 30 cows. Results are shown in Table 11. Cows consuming the MIX – 30 had reduced levels of the stress hormone, Thyroxine, improved body temperature and condition score and greatly improved reproductive levels even under the stress of no shade during summer.
### Table 11. MIX – 30 and Response of Beef Cows Grazing Endophyte Fescue

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Corn – Soybean Meal Mix</th>
<th>MIX – 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in BCS</td>
<td>-.2</td>
<td>+ .2</td>
</tr>
<tr>
<td>Change in Body Temperature, °F</td>
<td>+ .15</td>
<td>- .5</td>
</tr>
<tr>
<td>Serum Thyroxine, ng/ml</td>
<td>40.2</td>
<td>35.1</td>
</tr>
<tr>
<td>Pregnancy %</td>
<td>56.4</td>
<td>75.3</td>
</tr>
</tbody>
</table>

2002 KY Ruminant Nutrition Workshop, p. 7

Fescue endophyte certainly has many negative effects on performance of both stocker cattle and beef brood cows. While a good mineral supplement can improve performance of cattle on fescue, little evidence exists to indicate it is due to overcoming fescue toxicity. Other feed additives are available that can have a positive effect, however.
DEVELOPING FENCING FOR GRAZING SYSTEMS

Ken Johnson
USDA District Conservationist
Tompkinsville, KY

Expectation is founded on faith, and in faith lays opportunities. I suppose as we look at most farming operations most changes occur from force not by choice. What I propose today and hope to convince most of you; is that here is an opportunity to make more profit, if you’re willing to change and have faith that it will work.

Most of us have heard of, if not practiced, rotational grazing for a long time. The question many ask, “Is it worthwhile?” Does better grazing management make me any more money and what does it take to do a better job of grazing. I hope to at least provide some insight as to answers to that question.

I want to talk about the types of fencing systems available and what some of the materials cost.

Rather than trying to prove how much various systems improve profits, I am going to narrow down the cost associated with a few options and let you decide if it will pay in your system or one you may be considering.

As we start this process we must define our parameters. Let’s use a 40 acre field with 25 cow/calf pairs as a base to start. In order to give you a conservative answer, I want to use high material cost, knowing you may be able to do better.

**4-5 inch wood corner post**  $5.00 each
**High Tensile wire**  1 to 2 cents per foot (55 to 75 dollars per roll)
**Polywire**  2 to 3 cents per foot (23 to 40 dollars per roll)
**Step-in posts**  89 cents to $3.00 each

Our field is 1325 ft square containing a little over 40 acres.

**Option 1.**  Suppose we divide this field twice, once each direction, giving us 4, 10 acre paddocks with one water point in the center.

<table>
<thead>
<tr>
<th>Material</th>
<th>Length</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using polywire</td>
<td>2650 ft @ .03 per ft</td>
<td>$79.50</td>
</tr>
<tr>
<td>Step-in posts</td>
<td>88 @ $3.00</td>
<td>$264.00</td>
</tr>
</tbody>
</table>

**Total**  $343.50

Or, $8.59 per acre or 11 pounds of gain on calves or stockers.
Option 2. Same as one but, using High Tensile wire and a few wood corner posts

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Total Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire</td>
<td>2650 ft</td>
<td>@ .02 per ft</td>
<td>$53.00</td>
</tr>
<tr>
<td>Step-in posts</td>
<td>80</td>
<td>@ $3.00</td>
<td>$240.00</td>
</tr>
<tr>
<td>Wood Post</td>
<td>8</td>
<td>@ $5.00</td>
<td>$40.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>$333.00</strong></td>
</tr>
</tbody>
</table>

What does this mean in terms of farm profit?

Research at the University of Kentucky and many other places shows that by dividing a continuous grazed field into 2 to 4 paddocks will increase the gain per acre from 150 to over 300 pounds per aces. If it costs 11 pounds per acre to install the system and you get even 150 pound gain, you do the math.

You can use about any material cost and any calf price, charge 20 dollars an hour for your time, and the way I look at it: fence development Pays..... BIG TIME!
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 is probably the most important, yet often overlooked nutrient that cattle require. 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 15 years, is the use of lightweight 60gallon 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 $16 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 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 PVC pipe 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 loafig 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. Take notice of where cattle spend their time during winter grazing. It is usually 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. 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. Waterlines alone can range from 50 cents to over $1.00 per foot depending on whether the line is buried and the size of the pipe. Farms under 100 acres, with a pressurized system, and minimal elevation challenges, can usually do quite well with 1 inch pipe. Producers who are planning systems for larger operations or difficult terrain should consult a professional such as extension or NRSC engineers. There are usually cost share programs available in many areas of the country to assist with livestock water development. This may be an opportune time to reinvest recent livestock profits into upgrading water delivery systems to take your grazing operation to the next level.
There are many factors to consider when planting alternative crops. One of the most important factors is deciding if you need additional forage. In our area the basis of any grazing system should be perennial cool-season grasses and legumes. Have you done all that you can to improve that forage production through managed grazing and fertility management? If you have, then you may be ready to consider annual forages in your grazing system.

What time of the year do you need additional forage? The time of year you need forage will limit the alternative possibilities. Generally, additional forage is needed when the production of our perennial forage declines. In Ohio that is midsummer, and late fall through winter till early spring.

Some alternative crops are better suited than others to a particular livestock species. Different animal species have varying nutrition requirements and different grazing behaviors. These factors will further limit the possibilities of the alternative you may choose.

What will be done with the site used for the annual after grazing. The choices discussed here include summer annuals and winter annuals, each will present unique challenges when you decide how to use the ground once the annual crop is gone. Do you want to reseed to a perennial pasture? Will you plant another alternative once this one is harvested?

Can you get the crop established? Do you have access to the equipment needed to get the crop established properly? Can you do it in a timely manner? Some producers have tried an annual and had trouble getting it established. The production of the annual suffered. They then become discouraged about the usefulness of the annual in their system.

Finally, how do you plan to use the annual crop planted. Will you just graze it? Perhaps you want to use the annual in a combination of production systems, i.e., chop and graze.

All of these factors should be considered before planting any crop. There are very few cases which would merit destroying a perennial pasture just to plant an annual crop.

**Small Grains**

Most grain crops can also be used for forage. This includes small grains such as wheat, rye, barley, triticale, and spring oats. The most widely used are rye and spring oats.

Winter rye is the most winter hardy of the small grains. It has the most fall growth of the winter annuals and will break dormancy first in the spring. Forage-type varieties are available. Winter rye matures the earliest of the small grains and can be difficult to manage for spring grazing.

Spring oats can be used for spring and early summer pasture when sown early. Grazing oats early should allow a second grazing. Spring oats have also been successfully sown in August for fall and winter pasture. They will produce more tonnage than the other small grains in the fall growth period.
Frost kills the plants so there will be no growth the following spring. Generally, August planted oats are allowed to grow until they are killed by frost to accumulate as much forage as possible.

Winter wheat can provide excellent fall and spring pasture that is highly digestible. It has excellent winter hardiness and can be sown later in the fall, than the other choices.

Winter Barley can supply good quality grazing in the fall if seeded early. It should not be grazed as close or as late in the fall as wheat or rye. The spring-grazing period will be similar to rye.

Triticale is a hybrid of wheat and rye. Fall-seeded triticale can be used for late fall and early-spring pasture. Winter triticale should be managed similarly to wheat, and it matures about 5 to 10 days after wheat.

Grazing Small Grains

Grazing of small grains should begin when there is enough growth to support livestock. Typically the two biggest problems are delayed planting dates and wet fields during the prime grazing season. Sufficient growth in the fall for late fall grazing will be in the early planted stands. Begin grazing when at least six inches of growth is available, and leave a two to three-inch stubble after grazing. Heavy fall grazing increases the risk of winter kill. In the spring, graze only when fields are firm. Heavy or late-spring grazing greatly reduces grain yields. If you want grain then remove livestock when the plants begin stem elongation or "jointing" stage. Rye will be the first to begin jointing.

Summer-Annual Grasses

These annuals grow rapidly in late spring and summer. They can supplement pastures forages when perennial cool-season forages are in the summer slump. Sudangrass is fine-stemmed, leafy summer annual grass that can grow between three to eight-feet tall. It will regrow after grazing until a killing frost. Sudangrass usually contains lower levels of prussic acid and is usually lower yielding than the other sorghum family grasses.

Sorghum-sudangrass hybrids are made by crossing sorghum varieties with sudangrass. They resemble sudangrass, but are generally taller, have larger stems and leaves, and are higher yielding. Sorghum-sudangrass hybrids regrow after each grazing with proper environmental conditions.

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

Grazing Summer Annuals

These summer annuals should be grazed after they are 18-inches tall. Grazing earlier will weaken them causing slower regrowth. Trampling and wastage will increase when grazing is delayed past the boot stage. Plants reach the grazeable height of 18 to 30 inches about six to eight weeks after planting. Rotational grazing or strip grazing management should be practiced. A high stocking density should used to graze the grass down in less than 10 days. Clipping left over stems down to 8 inches will improve forage quality for the next grazing period.

Corn

Corn is a summer annual grass but it has a few more options for utilization than the preceding ones. Grazing standing corn can be a viable forage for some producers. Corn provides several options to livestock producers. As an annual it is extremely flexible as to when it can be grazed. It has been successfully used during the summer, fall and even winter. With the potential to produce more than ten tons of forage to the
acre, few annual crops can compare to corn in terms of dry matter (DM) yield per acre.

**Grazing Corn**

Standing corn has the nutritive composition to meet the requirements for many categories of livestock. From the animal’s nutritional standpoint, grazing immature corn is similar to grazing other summer annual forages. The big difference comes when the plant reaches maturity. With corn the loss in the feed value of the forage (leaves and stalk) is compensated by the grain produced.

Corn can be grazed during that mid-summer slump that occurs when the temperatures are hot and/or the moisture is short. Local producers have had success grazing sheep when corn plants are 18 inches tall, rotating quickly as to protect the growing point (3-4 inches above the ground) and rotating back into the corn throughout the summer.

Harvesting corn by grazing may take place from 30 to 100 or more days following planting. Traditionally, producers have planted grazing corn as they would for corn silage, planting corn in late May or early June and grazing it 70 to 90 days following planting. This late summer to early fall grazing allows them to stockpile their perennial pastures for late fall/early winter grazing.

Corn may also be grazed extremely late in the season, even after it is fully mature, providing needed energy and shelter during the winter months. Typically, the corn plant loses some leaves and stalks begin to break down as the winter progresses. This causes a loss in digestible nutrients and protein. However, the remaining stalks, leaves, and grain are still excellent supplemental feed for over-wintering beef cows, stockers, and growing animals. Depending on the type of livestock used, producers may have to supplement to compensate for lower protein levels.

**Animal Health Concerns with Annuals**

There are a few animal health concerns that producers should be aware of before grazing annuals. The following have been written about many times and are repeated here as a reminder.

**Small Grains**

Supplement lush spring pastures with high-magnesium mineral blocks or mineral-salt mixes to reduce the risk of grass tetany.

Split nitrogen applications to avoid nitrate poisoning.

**Summer Annuals**

Prussic acid poisoning can occur when feeding sudangrass, sorghum-sudangrass hybrids, forage sorghum, or grain sorghum. These species contain varying concentrations of cyanogenic glucosides, which are converted to prussic acid, also known as hydrogen cyanide (HCN). Basically the animal can die of asphyxiation. Prussic acid acts rapidly, frequently killing animals in minutes. Symptoms include excess salivation, difficult breathing, staggering, convulsions, and collapse.

Any stress condition that retards plant growth can increase prussic acid levels in plants. Hydrogen cyanide is released when leaves are damaged by frost, drought, bruising, cutting, trampling, crushing, or wilting.

Ways you can reduce the risk of prussic acid poisoning from forage sorghum, sudangrass, and sorghum-sudangrass hybrids include:

- Graze or greenchop only when grass exceeds 18 inches in height.
- Do not graze wilted plants or plants with young tillers.
• Do not graze plants during or shortly after a drought when growth has been reduced.

• Do not graze on nights when frost is likely. High levels of the toxic compounds are produced within hours after a frost occurs.

• Do not graze after a killing frost until the plants are dry. Wait five to seven days to allow the released cyanide to dissipate.

• Do not graze for two weeks after a non-killing frost.

• Delay feeding of silage for six to eight weeks after ensiling. Fresh forage is generally higher in cyanide than in silage or hay because cyanide is volatile and dissipates as the forage dries. However, hay or silage that likely contained high cyanide levels at harvest should be analyzed for HCN content before feeding.

• Split applications of nitrogen decrease the risk of prussic acid toxicity, as do proper levels of phosphorus and potassium in the soil.

• Don't allow hungry or stressed animals to graze young sorghum grass growth.

Nitrate poisoning can occur under conditions of high nitrogen fertilization, heavy manure applications, drought, overcast weather, or other stress conditions that retard plant growth. Under these stressful conditions, high nitrate levels accumulate in the crop. Animal symptoms include rapid breathing, fast and weak heartbeat, muscle tremors, staggering, and death if corrective steps are not taken.

The same management precautions for prussic acid poisoning help prevent nitrate poisoning. Pearl millet and corn can accumulate high nitrate levels leading to nitrate poisoning. High nitrate levels persist when forages are cut for hay, but ensiling the crop reduces nitrates by one-half. If you suspect that forage contains high nitrate levels, have it tested before feeding.

Poisoning of horses fed sudangrass, sorghum-sudangrass hybrids, and forage sorghum has been reported. The exact cause of poisoning is not known. Do not feed horses any of these summer annual grasses.
### Table 1. Establishment Information

<table>
<thead>
<tr>
<th>Forages</th>
<th>Seeding Rate lb/ac</th>
<th>Seeding Date</th>
<th>Days from seeding to Grazing</th>
<th>Yield lb/ac of Dry Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Small Grains</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter Wheat</td>
<td>120</td>
<td>--------------</td>
<td>8/15 - 10/1</td>
<td>30 - 40</td>
</tr>
<tr>
<td>Barley</td>
<td>144</td>
<td>--------------</td>
<td>8/15 - 10/1</td>
<td>30 - 40</td>
</tr>
<tr>
<td>Triticale</td>
<td>120</td>
<td>--------------</td>
<td>8/15 - 10/1</td>
<td>30 - 40</td>
</tr>
<tr>
<td>Rye</td>
<td>120</td>
<td>--------------</td>
<td>8/15 - 10/1</td>
<td>30 - 40</td>
</tr>
<tr>
<td>Spring Oats</td>
<td>96</td>
<td>3/1 - 4/15</td>
<td>8/1 - 9/1</td>
<td>30 - 50</td>
</tr>
<tr>
<td><strong>Summer Annuals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sudan</td>
<td>25</td>
<td>5/1 - 7/15</td>
<td>30 - 50</td>
<td>6-8000</td>
</tr>
<tr>
<td>Sorghum-Sudan</td>
<td>20 – 25</td>
<td>5/1 - 7/15</td>
<td>30 - 50</td>
<td>8-10,000</td>
</tr>
<tr>
<td>Millet</td>
<td>15 – 20</td>
<td>5/1 - 7/15</td>
<td>30 - 40</td>
<td>6-8000</td>
</tr>
<tr>
<td>Corn</td>
<td>30,000 plants/ac</td>
<td>5/1 - 7/1</td>
<td>50 - 115</td>
<td>5 - 25,000</td>
</tr>
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</table>

### Table 2. Forage Quality

<table>
<thead>
<tr>
<th>Forages</th>
<th>Crude Protein %</th>
<th>Total Digestible Nutrients %</th>
<th>Acid Detergent Fiber</th>
<th>Neutral Detergent Fiber</th>
<th>Palatability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Small Grains</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter Wheat</td>
<td>8 - 27</td>
<td>55 – 66</td>
<td>18 – 40</td>
<td>46 – 63</td>
<td>High</td>
</tr>
<tr>
<td>Barley</td>
<td>9 - 32</td>
<td>62 – 66</td>
<td>23 – 36</td>
<td>53 – 56</td>
<td>Medium to High</td>
</tr>
<tr>
<td>Triticale</td>
<td>10 - 31</td>
<td>52 – 67</td>
<td>30 – 38</td>
<td>48 - 61</td>
<td>Medium</td>
</tr>
<tr>
<td>Rye</td>
<td>9 - 33</td>
<td>54 – 71</td>
<td>25 – 37</td>
<td>27 - 59</td>
<td>Medium</td>
</tr>
<tr>
<td>Spring Oats</td>
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<td>54 – 67</td>
<td>30 – 40</td>
<td>51 - 59</td>
<td>High</td>
</tr>
<tr>
<td><strong>Summer Annuals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sudan</td>
<td>8 - 16</td>
<td>53 – 68</td>
<td>34 – 42</td>
<td>58 - 70</td>
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</tr>
<tr>
<td>Sorghum-Sudan</td>
<td>8 - 20</td>
<td>55 – 71</td>
<td>29 – 41</td>
<td>55 - 66</td>
<td>Medium to High</td>
</tr>
<tr>
<td>Millet</td>
<td>9 - 24</td>
<td>52 – 62</td>
<td>28 – 42</td>
<td>46 - 67</td>
<td>High</td>
</tr>
<tr>
<td>Corn</td>
<td>7 - 13</td>
<td>54 – 74</td>
<td>21 – 34</td>
<td>38 - 59</td>
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<td>Forages</td>
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<td>Removal Height</td>
<td>Rest period</td>
<td>When to Graze</td>
<td>Removal Height</td>
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</tr>
<tr>
<td><strong>Small Grains</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Winter wheat</td>
<td>6-8 in</td>
<td>2 – 3 in</td>
<td>2-4 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barley</td>
<td>6-8 in</td>
<td>2 – 3 in</td>
<td>2-4 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triticale</td>
<td>6-8 in</td>
<td>2 – 3 in</td>
<td>2-4 weeks</td>
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<tr>
<td>Rye</td>
<td>6-8 in</td>
<td>2 – 3 in</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Spring Oats</td>
<td>6-8 in</td>
<td>2 – 3 in</td>
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<td></td>
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<tr>
<td><strong>Summer Annuals</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sudan</td>
<td></td>
<td></td>
<td></td>
<td>18 - 24 in</td>
<td>6 - 8 in</td>
</tr>
<tr>
<td>Sorghum-Sudan</td>
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<td></td>
<td></td>
<td>30 + in</td>
<td>6 - 8 in</td>
</tr>
<tr>
<td>Millet</td>
<td></td>
<td></td>
<td></td>
<td>18 - 24 in</td>
<td>6 - 8 in</td>
</tr>
<tr>
<td>Corn</td>
<td></td>
<td></td>
<td></td>
<td>18 - 24 in</td>
<td>6 - 8 in</td>
</tr>
</tbody>
</table>

For further information visit the Ohio Forage Network at: [http://forages.osu.edu](http://forages.osu.edu) and check out the following publications.

Maximizing Fall and Winter Grazing of Beef Cows and Stocker Cattle Bulletin 872 [http://ohioline.osu.edu/b872/index.html](http://ohioline.osu.edu/b872/index.html)


Winter Rye for Extending the Grazing Season AGF-026-00 [http://ohioline.osu.edu/agf-fact/0026.html](http://ohioline.osu.edu/agf-fact/0026.html)
PERENNIAL WARM SEASON GRASSES IN GRAZING PROGRAMS

Mark Kennedy
State Grassland Specialist
USDA-NRCS
Houston, MO

Many warm season perennial grasses were once an important part of the plant community in much of the Midwest. Conversion to cropping systems, overgrazing, lack of regular fire and increased competition from cool-season grasses and legumes have caused many of these grasses to disappear from much of the region. However, warm season grasses can compliment cool-season pastures if managed properly. Midwest stockmen are rediscovering the usefulness of warm season grasses in their overall forage program. Adding these grasses to forage systems has resulted in increased gains and improved livestock performance during the summer months when cool-season grasses are at their low point of growth and quality. Warm season grasses are highly palatable to livestock prior to heading and can produce beef gains of over 2 pounds per day during the summer season. Graziers should take advantage of the inherent differences in the seasonal growth cycles of various forages to supply desirable forage to livestock throughout the grazing season.

There are some distinct advantages and potential disadvantages to incorporating warm season grasses into a forage system. Warm season grasses provide good summer production and can aid in managing fescue endophyte problems. Warm season grasses can be managed for high quality and good animal performance. If used in haying systems, warm season grasses are harvested during more favorable weather conditions. Native warm season grasses provide valuable wildlife habitat. They are adapted to this region and are very persistent with proper management. The potential drawbacks to utilizing warm season grasses are the high cost of establishment and they may be slow to establish. Most warm season grasses may need specialized drills or other equipment for planting and may take a couple of years to get a fully productive stand. Many warm season grasses, especially the native warm season grasses, will require good grazing management to maintain a productive stand.

When selecting forage species 3 criteria should be considered: persistence, yield distribution, and forage quality. Many forage species are marketed based solely on one or two of these characteristics; however, when selecting a new forage species to compliment an existing forage system; the forage should possess all three characteristics. Warm season grasses are adapted to a wide range of soil and climatic conditions. The following table illustrates the adaptability of warm season grasses.

Warm season grasses start growth about four to six weeks later than cool-season grasses. As a result, spring soil moisture is conserved. Warm season grasses initiate growth at temperatures of 55 – 60 degrees Fahrenheit. The growth rate increases as temperature increases to a maximum of about 95 degrees. They usually produce at least 60% of their growth between June 1 and August 31. However, warm season grasses have differing growth
cycles. Switchgrass and Eastern Gamagrass are the earliest to break dormancy and are also the earliest maturing. Switchgrass produces 40% of its growth in June, two to three weeks earlier than big bluestem. Eastern gamagrass produces 85% of its growth between May 15 and August 31. Big Bluestem produces 70% of its growth between June 15 and August 31. Indiangrass is 2 to 3 weeks later than Big Bluestem, producing 70% of its growth between July 1 and September 15. The growth curve for Bermudagrass is similar to Big Bluestem with about 70% of the growth occurring between June 15 and August 31. The old world bluestems, particularly Caucasian, stretch their growth out over a longer season with 50% of the growth being produced between May 15 and July 15, and 50% produced between July 15 and October 1. Warm season grasses use less water than cool-season grasses to produce similar growth and are more efficient in nitrogen utilization. Warm season grasses fill in the ‘summer slump’ associated with cool-season grasses and extend the grazing season. By having warm season grasses in a forage system, a producer can make maximum use of cool season forages in the spring, rest them during the summer while grazing warm season grasses and extend the grazing on cool-season pastures in the fall and winter.

Forage quality measurements (protein, fiber, and digestibility) of warm season grasses have consistently been lower than measurement for cool-season grasses at the same growth stage in the past. However, more careful studies of actual animal gains from cool-season and warm season pastures has revealed that warm season grasses may be much more nutritious than their quality analysis indicates. In a University of Missouri trial at the Forage Systems Research Center at Linneus, Missouri, milk production of beef cows grazing big bluestem was equivalent to that of cows grazing high quality bromegrass-alfalfa pastures. May through August average daily gains on steers were 1.7 lb/head per day at the MDC Talbot Demonstration Farm near Mt. Vernon and 2.5 lb/head at the Seat Demonstration Farm in Worth County, MO. Nebraska tests recorded 1.35 lb/day on switchgrass, 1.74 lb/day on indiangrass and 1.97 lb/day on big bluestem. Dairy heifers grazing eastern gamagrass in a grazing trial at the University of Missouri Southwest Research Center had equal gains to those grazing alfalfa pastures (2.4 lb/hd/day). Dairy cattle at the Southwest Research Center’s seasonal grass based dairy had mean seasonal milk production of 49.38 lbs. on bermudagrass and 53.63 lbs. on Caucasian bluestem. Stocker cattle grazing Caucasian bluestem in a demonstration on a private farm in southwest Missouri gained from 1.5 to 2.4 lbs/hd/day for 90 days during a 4-year study. This farm consistently produced 200 lbs. of beef gain per acre per month every month that the Caucasian could be grazed. Other producers across south Missouri have reported 400 to 1000 lbs. of beef gain per acre for stockers grazing various warm season grasses. The following table summarizes data collected from over 20 participating farms in south Missouri that were involved in a collaborative forage

<table>
<thead>
<tr>
<th>Species</th>
<th>Yield</th>
<th>Wetness</th>
<th>Low Fertility</th>
<th>Drought Tolerance</th>
<th>Heat Tolerance</th>
<th>Cold Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bermudagrass</td>
<td>M - H</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td>Old World Bluestem</td>
<td>M - H</td>
<td>Poor</td>
<td>Fair</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Big Bluestem</td>
<td>M - H</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Indiangrass</td>
<td>M - H</td>
<td>Fair</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Eastern Gamagrass</td>
<td>H</td>
<td>Good</td>
<td>Fair</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Switchgrass</td>
<td>M - H</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
</tbody>
</table>
quality diet study with Texas A&M University and the Natural Resources Conservation Service. Diet quality was estimated by analyzing fecal samples through near-infrared spectrometry and comparing to databases of known diet quality.

<table>
<thead>
<tr>
<th>Warm Season Grass Quality – Southern MO Data (1994-2000)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Species</strong></td>
</tr>
<tr>
<td>Big Bluestem</td>
</tr>
<tr>
<td>Switchgrass</td>
</tr>
<tr>
<td>Eastern Gamagrass</td>
</tr>
<tr>
<td>Bermudagrass</td>
</tr>
<tr>
<td>Caucasian Bluestem</td>
</tr>
</tbody>
</table>

Warm season grasses are good, viable options to complement cool-season pastures in much of the Midwest and Corn Belt regions. They are adapted, provide high yields of good quality forage and are persistent. The native warm season grasses may provide additional wildlife benefits and may provide additional cost-share opportunities. If managed properly, good animal performance should be expected while grazing warm season grasses. Proper grazing management is crucial to maintain dense, productive, nutritious stands of warm season grass. Most of the native warm season grasses will need rest periods of 35 - 40 days or more and maintain stubble heights of 8 inches or more. The introduced warm season grasses generally can persist with shorter rest period and shorter minimum grazing heights usually 2 – 4 inches.

In summary we should realize that there are no “silver bullets” when it comes to forages. Producers should choose a forage that:

- Best compliments the present forage system
- Fills needed gaps in forage production
- Meets producer goals and management
- And fits within you budget!
Over the past few years there have been a number of production livestock producers that have realized the benefits of grazing turnips and other brassicas. Turnips and other brassicas have traditionally been utilized for late season grazing to help extend the grazing season. But other ways are being found to utilize these highly productive, high quality forage crops. My purpose in this presentation is to introduce the different types of turnips and brassicas and explain how they can be utilized for various systems and different uses.

**Turnips:** Within the turnip family there are different types that provide different opportunities for the livestock producer.

**Leafy Types:** These are typically varieties that have good leaf production and a tap type root. The variety most common in this type is the old garden variety “Seven Top”. There has not been research to improve this type of turnip when it comes to animal performance, palatability or dry matter yield production.

**Forage Turnips:** This type of turnip was developed to provide multiple grazing opportunities. While other types of turnips have one main growing point this type has from 6-20 growing points that shoot up new growth after being grazed. The bulb is firmly anchored so the animals will not pull out the bulb when grazing. If strip grazing, and only looking for one harvest, this type has shown in university studies to provide significantly more protein produced per acre over bulb type turnips, with 50% of the bulb being consumable. Appin Forage Turnip is the most popular variety in this category.

Appin Forage Turnip was bred for improved palatability and regrowth for multiple harvests. Its high leaf to bulb ratio results in a very leafy crop with high digestibility.

**Globe Types:** This type of turnip is probably the most common type sown by producers. The bulb on this turnip can get quite large and is mainly above ground with the leaves coming from one main growing point. The most common in this type is the old garden variety “Purple Top”. Newer varieties would include York Green Globe and Dynamo.

**Tankard Turnips:** This type of turnip is a high yielding, versatile, highly nutritious, traditional soft turnip of early maturity. It is characterized by a much higher proportion of leaf compared to globe type turnips. The tankard shaped bulb, two thirds of which grows above ground, enhances utilization. This type is predominantly used for winter forage. Varieties in this category include Barkant and Sampson.

**Hybrid Brassicas:** Hybrid Brassicas are crosses between turnips and forage rape, kale and rape, Chinese cabbage and rape, etc... These products vary in usage, yield, palatability, and quality. Some of the more popular varieties in this category are Pasja (Forage Turnip X Forage Rape) and Tyfon (Chinese Cabbage X Rape) and Raptor. These types generally have a deeper tap root instead of a bulb. The improved products have very high yields of high quality leaves.
**Forage Rape:** Forage rapes differ from rape varieties that were mainly bred for seed or oil production (like Dwarf Essex rape). The improved rape varieties have improved yield, palatability, and often can be grazed more than one time. Improved varieties have a higher leaf to stem ratio, thereby providing improved animal utilization. Improved varieties include Bonar and Barnopoli.

**Forage Kale:** Forage Kales are late maturing and provide late season forage. Generally these are planted in the spring and harvested in the winter. The long wait will generally be worth it as improved varieties can yield as high as 10 tons per acre of very high quality forage. Improved varieties include Maris Kestral Kale.

**Swedes:** Swedes are also late maturing crops that can have bulbs as large as a football. These products have a very high bulb to stem ratio and are grazed one time – generally late fall or into the winter. Improved varieties include Major Plus and Winton.

**Forage Yields:** Yields on the different types of products vary widely. The varieties that were bred for multiple grazings often can yield more...if grazed multiple times. If grazed one time there is minimal difference in DM yield. However, the yield will be proportionately either higher in very high quality leaves or higher in high energy bulbs. Products like Pasja will deliver only leaves but can be grazed up to 6-7 times per year when spring planted. Cliff Schuette in Breese, IL reported grazing spring planted Pasja (planted with oats) six times in 2005. As of October 2005 the Pasja and oats yielded over 16,000# DM with 30% stand of Pasja left for grazing with the volunteer oats that came back. The average forage quality was 27.5% CP and 139 RFV in October.

When planted after cereal grains are harvested brassica yields can be as high as six tons per acre. When planted after corn silage or early harvested corn yields can be as high as five tons per acre when planted with cereal grains or Italian ryegrass.

**Forage Quality:** The forage quality on brassicas can be very high. Tests on Appin Forage Turnips have shown 30+% CP, 340+ RFV, and 90+ Digestibility. Tests on Pasja have shown similar results. The leaves of the brassicas generally run 25-30% CP and 75-90% digestible. The bulbs generally run 10-13% CP with a RFV of 80-100.

Because the quality is so high, it is important to provide additional fiber to ensure best utilization of the brassicas.

**Utilization of products:**

**Spring Planted:** Some brassicas (Appin, Pasja, and Tyfon) can be planted in the spring of the year and utilized within 50-70 days when planted with ryegrass or spring oats. These products offer the opportunity to be grazed four to six times from first grazing to late fall. Others (Bonar, Barnopoli) can be grazed mid-summer and then again in the fall if properly grazed. Kale and Swedes are often planted at this time as well. Rapes, Kales, or Swedes will probably need herbicide treatments for weed control (follow label directions).

**Summer Planted:** Many beef and dairy farmers have been utilizing Pasja as a companion to summer annual grasses (BMR Sorghum Sudangrass, Pearl Millet, and Sudangrass) to improve the forage quality of the crop. At the Cove Mountain farm in south central Pennsylvania, dairy cows increased 8#/head/day in milk production when they grazed BMR Sorghum Sudangrass and Pasja during the summer of 2004 instead of grazing permanent pasture. Appin has also been utilized by beef farmers with summer annuals across the Midwest and Mid-Atlantic regions for this purpose, with gains reportedly at 3#/head/day when grazing the mixture. Rapes planted at this time have
also provided excellent summer-winter feed for sheep producers.

**Late-Summer-Early Fall Plantings:** This has been the traditional planting time for most turnips. Sowing after corn silage is harvested or early corn is shelled can provide tremendous forage to extend the grazing season. Over the past few years many Midwestern producers have flown oats, cereal rye, and turnips into standing corn with pretty good success. If trying this practice wait until the corn leaves are drying 1/3- ½ of the way up the plant so that proper sunlight can reach the seedlings.

**Grazing Brassicas for Best Utilization:** When grazing turnips or hybrid brassicas; leave a minimum of four inches (4”) of the plant for the best opportunity for quick regrowth. Strip grazing and utilizing back fences will allow for improved utilization and forage regrowth. When grazing Rape leave 10-12” or the stem for most rapid regrowth. When grazing only one time, strip graze to enhance utilization and reduce wastage.

**Fertility Management:** If you wish to achieve multiple grazings you need to fertilize well (~150-200# N/A in 2-4 applications, and 60-80#P/A). Cliff Schuette used the equivalent of 300# N by utilizing hog manure.

**Caution:** DO NOT turn animals into brassicas when they are hungry. Make sure your electric fence is on when strip grazing. When animals acquire the taste for brassicas they can eat too much and have health problems, even to the point of death.

Do not grow brassica crops on the same site for more than two consecutive years. This will prevent the buildup of pathogens which could limit stand productivity.

For further management and product information visit [http://www.ampacseed.com/brassicas.htm](http://www.ampacseed.com/brassicas.htm) or contact me at d.robison@ampacseed.com.
Mr. Cowpie’s Party Animal is a small agriculture-entertainment business owned by Doug and Joan Gehner of California, Kentucky. Our business is a mobile petting zoo that incorporates singing and storytelling into an entertaining yet very educational program for children and adults. Our “party” animals consist of horses, goats, chickens, rabbits and many other traditional and non-traditional farm animals. They are a major source of our family income.

Prior to 2005, hay and grain were being fed daily to the farm animals even during the summer months because our tall fescue pasture was of such poor quality. After a call to the Campbell County Cooperative Extension Service and a farm visit by the Agriculture Extension agent, a pasture renovation program was developed. The first and possibly the most important part of this program was to soil test the pasture. The soil test results indicated that the soil pH was very good at 7.1 but phosphorus and potash were low. During the spring of 2005 the pasture was fertilized and certified varieties of red ladino clover and orchardgrass were frost seeded. Both boundary and temporary electric fencing was constructed to allow for the implementation of a rotational grazing system. A six acre pasture field was divided into five paddocks.

The results of our work were amazing. We were fortunate to get an excellent stand of legumes established that not only improved our forage quality but also supplied the nitrogen needed for additional growth. Even during the drought of 2005 we had an abundance of high quality forages for our six horses and other farm animals. Due to the improved pastures we have purchased and fed very little hay and grain to the animals. We anticipate having adequate pasture for the animals until mid to late January of 2006. Not only has the pasture improvements reduced our feeding expenses but it has also reduced some erosion and overgrazing problems that we were experiencing. The animals have been extremely healthy and are actually becoming a little too fat on the improved pasture. The knowledge that we have gained from implementing the pasture renovation program will allow us to manage our pasture in a more productive and profitable way.
HOW I USE MY PASTURES

Russell C. Hackley
Beef Producer
Clarkson, KY

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 12 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!
Our 102 acre farm is all permanent cool season grass pasture, except for 6 acres of woods and 2 acres around the house/barns. Paddocks vary in size from 2 to 20 acres. Fenceline waterers are used to place water in each pasture. Soils are tested routinely; organic matter soil levels have increased after 12 years of rotational grazing. Commercial fertilizer is used sparingly. We plan to use more composted manure for fertilizer in the future. Dung beetle populations are encouraged. We obtain hay from leased ground and buy the balance from neighbors. Larue and Hart counties are areas of hay surplus so hay is relatively inexpensive. As a result we maintain a relatively high stocking rate (50 beef cows, 50 + ewes and their offspring) on 96 acres of pasture. We have a tight calving season of about 45 days, wean our calves at about 7 months of age, background calves on the farm and then ship to a Kansas feedlot on retained ownership. This frees up pasture for cows and sheep.

Parasite resistant sheep and goats are being intensively selected. Worm parasites are monitored using the FAMACHA anemia guide during the June – September worm season and worm egg counts periodically. Genetic selection and co-grazing with the beef herd resulted in no losses due to worm parasites among the Bamoka sheep during the dry year of 2005 and minimal loss in 2004, a wet year. This effective worm control program was achieved without use of routine flock deworming and very few individual dewormings.

After browse is consumed, goats graze fescue/orchardgrass. We have had good success growing perennial ryegrass. We observe fewer weeds as a result of sheep and goat pressure; this has allowed more grass to grow. With sheep, care must be taken to keep them rotating to avoid overgrazing. Sheep numbers were cut in 2005 nearly in half due to drought and our decision to provide the cows the best grazing. In 2005, we installed a heavy use hay feeding pad using geotextile fabric. This will reduce the amount of pasture damaged when feeding rolled hay to the cow herd. Both sheep and goats graze stockpiled fescue when available. Red and Ladino clovers are added using a no-till drill. We will continue multi-species grazing of hair-sheep and beef cattle as we see this as sustainable, manageable and beneficial.

Goats were initially purchased to clear brush. After two summers a few goats turned the 6 acre thicket into a park-like setting, allowing for more grass growth. The sheep (easy-care Bamoka hair sheep) graze the same pastures as the cow herd. Easy-care sheep consume some browse. Sheep and goats often share the same pasture with the cow/calf herd. Sheep and goats co-grazed for a few years but no longer do. Currently the meat goat flock is managed on a leased 10 acre facility with 8 paddocks. Weaned kids are returned to the home farm where they graze paddocks and weed lots close to buildings or are confined. Both sheep and goats have access to night-pens for predator prevention.
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