Stream Restoration Field Day Draws Crowd From State and Federal Agencies

Dr. Dirk Philipp, Assistant Professor

In April of this year, representatives from state and federal agencies and from educational institutions, including the University of Arkansas System, the Arkansas Game and Fish Commission (AGFC), the Natural Resources Conservation Service (NRCS) and the Arkansas Natural Resources Commission (ANRC), gathered at the University of Arkansas-Monticello to learn more about a recently initiated stream restoration project. Under the leadership of Dr. Kelly Bryant, director of the Southeast Research and Extension Center in Monticello, a degraded stream channel located on research pastureland was selected two years ago to investigate and demonstrate restoration strategies for these types of eroded channels, which are common on southeastern Arkansas pastureland. Personnel from various organizations were then invited in early 2011 to give the interdisciplinary team of scientists behind the project the chance to highlight their accomplishments and to provide feedback and recommendations for potential long-term partnerships.

2011 Arkansas 4-H State Horse Show Wrap-Up

Dr. Mark Russell, Instructor

The 2011 4-H State Horse Show took place July 12-14 at the White County Fairgrounds. The show boasted approximately 125 participants from all over the state for a total of more than 450 entries.

Here is a breakdown of the winners:

High Point Exhibitors (see pictures on page 2)
Junior Speed: Megan Howell, Garland Co.
Senior Speed: Katherine Holsapple, Lawrence Co.
Junior Performance: Hailey Henderson, Benton Co.
Senior Performance: Lensey Watson, Benton Co.
High Point Pony Exhibitor: Jaydon Jarnagan, Benton Co.

Champion Horse Judging Teams
Junior Team: Benton County
Senior Team: Washington County

Champion Hippology Teams
Junior Team: Faulkner County
Senior Team: Faulkner County

Champion Horse Bowl Teams
Junior Team: Faulkner County
Senior Team: Faulkner County

Individual Demonstration Champions
Junior Division: Cody Isgrigg, Benton Co.
Senior Division: Jennifer Isgrigg, Benton Co.

Team Demonstration Champions
Junior Division: Abby Trammell and Jennifer Brooks, Dallas Co.
Senior Division: Amber Trammell and Francis Roberts, Dallas Co.

Public Speaking
Junior Division: Madison Powell, White Co.
Senior Division: Jacob Copps, Benton Co.

For more information about the 4-H Horse Program, contact Mark Russell at 501-671-2190 or mrrussell@uaex.edu.
Since 2009 the University of Arkansas conducted eight pasture nutrient and fertility management demonstrations. These demonstrations measured the amount of nutrients in a bale of hay then fed the hay in a manner to distribute the nutrients evenly across the field. Soil samples were collected in the designated hay feeding area before hay feeding began and again in the spring, when hay feeding was over. Records were kept on the number of bales fed and any supplemental feed fed in the demonstration field. Based on the data collected, the amount of nutrients applied to the field from the hay were calculated and compared to the change in soil fertility. The average nutrient content of a 4’ x 5’ round bale of bermuda hay was 16 lb N, 5 lb P₂O₅ and 18 lb K₂O. Using current commercial fertilizer prices, the hay had a fertilizer value of $22.16.

Producers could feed the hay in a concentrated area or move the feeding area each time new hay was fed. With the hay being fed in different locations, it spread the fertility from the hay evenly across the field to be recycled in next year’s forage crop. In addition, these feeding areas had less vegetative trampling, which reduced problems with mud.

### Improvement in P, K and organic matter due to hay feeding concentrated to one area

<table>
<thead>
<tr>
<th>County</th>
<th>P lb/ac</th>
<th>K lb/ac</th>
<th>Organic Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bradley</td>
<td>+216</td>
<td>+1283</td>
<td>+13.2</td>
</tr>
<tr>
<td>Union</td>
<td>+734</td>
<td>+2673</td>
<td>+1.45</td>
</tr>
</tbody>
</table>

### Improvement in P, K and organic matter due to hay feeding moved evenly around a designated area

<table>
<thead>
<tr>
<th>County</th>
<th>P lbs/ac</th>
<th>K lbs/ac</th>
<th>Organic Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleburne</td>
<td>+22</td>
<td>+170</td>
<td>+2.4</td>
</tr>
<tr>
<td>Drew</td>
<td>+20</td>
<td>+186</td>
<td>+0.7</td>
</tr>
<tr>
<td>White</td>
<td>+22</td>
<td>+172</td>
<td></td>
</tr>
<tr>
<td>Yell</td>
<td>+143</td>
<td>+342</td>
<td></td>
</tr>
</tbody>
</table>

In summary, moving the hay feeding area within a designated field each time hay is fed will help to build soil test P and K as well as increase the percent hay feeding areas increased dramatically. Optimum soil fertility for forages is phosphorus (P) levels between 72 to 100 lb/acre and potassium (K) levels between 262 to 350 lb/acre. These concentrated hay feeding areas would also become very muddy, creating a bare spot where only weeds grew back.

Producers in Cleburne, Drew, White and Yell counties chose to move the hay feeding area each time new hay was fed. With the hay being fed in different locations, it spread the fertility from the hay evenly across the field to be recycled in next year’s forage crop.
organic matter. So as we approach the hay feeding period, begin thinking about where hay will be fed this winter. Preference should be given to fields with lower soil fertility. Increasing soil fertility levels strengthens the existing pastures. The plants will have better root growth, increased persistence and yield.

Feed reserves are in short supply, and prices are high this year. So, what are the alternatives? Dairy farmers in California have long had the attitude that the rations of cows could contain a small percentage of about anything—almond hulls, tomato cannery waste, straw, etc. However, all waste feeds are not appropriate and may not be economical, even if the price is attractive. It may be more important to eliminate waste of hay by protecting it in storage and at the time of feeding.

There are questions that should be answered before using an alternative feed for dairy cows:

1. Are there any chemical residues or materials that will appear in milk?
   This is important even for common feeds such as drought-stricken corn or corn silage. The molds on these crops may contain toxins, such as aflatoxin, that affect the cow and may appear in milk. Grain that was intended for seed will be colored to alert that it was treated with a fungicide. Pesticide chemicals may also have been used on crops. However, carrots, pumpkins, potatoes, onions, citrus pulp or peels and apple pomace are potential feeds that have a low risk of contamination. However, lettuce, cabbage, zucchini and squash wastes should be treated cautiously.

2. Is there a risk that milk might be tainted?
   Onions certainly taint milk, and citrus pulp or peels might do so too. Some weeds can also be a problem. That is not a problem for dry cows or perhaps heifers.

3. Will the waste feed affect the health of cows?
   You may need to check with your veterinarian about some feeds. Some forages (especially sorghum fodder and sudangrass crops) may contain nitrates or prussic acid at dangerous levels. In general, too much grain will require balanced fiber and chemical buffers to prevent acidosis and lameness. Adjust cows with slow ration changes and add 0.5 to 1.0 percent sodium bicarbonate. Corn, sorghum and oats are the safest grains; barley and triticale are of moderate risk; and wheat is the most dangerous. Grain that is finely ground is much more hazardous than the coarsely ground or cracked grain. Other starches can be a problem too.

4. How much food value is contained?
   Many alternative feeds contain a lot of water. Even potatoes are 80 percent water, and some items may contain even more water. If you purchase wet grains or wet byproducts, know how much water you are getting. That affects the amount cows can consume. Pasture crops, haylage and silage also vary in water content, so cows must consume much more than when eating dry feeds, which are usually 88 to 92 percent dry matter (8 to 12 percent water). Water dilutes everything, so cows may not be able to consume enough feed to meet energy and protein requirements. The same principle exists in comparing poor-quality hay with excellent-quality grass or alfalfa hay.

5. How does the cost compare to the typical feeds?
   Are you really getting ahead when you buy corn silage or haylage and have it hauled 150 miles compared to buying local hay? What is the cost of energy and protein from alfalfa hay compared to lower-quality local grass hay if additional corn and soybean meal will be needed as a supplement? You really need to compare the cost of digestible nutrients at the point of delivery.

This is a short summation of things to consider when buying alternative feeds. A web site, http://www.ag.ndsu.edu/pubs/ansci/livestoc/as1182.html, may be helpful. It contains a large number of feeds and a brief discussion of many alternative feeds for ruminants. Again, it may be more important to eliminate waste of hay by protecting it in storage and at the time of feeding.

Worrying about the severe drought and how we are going to make it through the winter with limited or no stored forage has monopolized most of our thoughts, energy and time. There are some critical steps that need to be made in order for us to make it. Although these steps may not be palatable (because we will have to change the way we do things, it may take more work than what we want to put in or it may cost more than we want to spend), our goal should be to have an intact cattle operation when grass begins to grow next spring.

1. Cull cowherd to a number that you can afford to winter by getting rid of old cows, less productive cows and/or cows with higher nutrient requirements. Cows that are expected to calve in the fall will require more nutrients to keep them in proper condition, and a higher level of nutrition equates to higher cost of winter feeding. This number of cows may be the long-term carrying capacity for your operation.
2. Determine how much hay you have and how much you can feed daily for the expected feeding period. If you have as little as 10 pounds of hay available per cow-day, you may not have to purchase more hay or roughage to provide a balanced diet to your cows.

3. Test your hay or other roughage source. It is impossible to determine what your cows will require without some knowledge of the quality of what they are being fed. Hay is variable and moderate to low in protein and energy. Crop residues are more variable and generally low in protein and energy.

4. Cross-fence your farm now while you are feeding hay anyway. Keep cows on a smaller area of your farm while you are feeding them. You will be surprised how much forage growth you will have if pastures are allowed to rest. Since you have the farm subdivided, you can utilize these separate pastures in a rotational grazing system next spring and summer and you may have the additional benefit of increased pasture health and improved harvest efficiency.

5. Plant cool-season annual grasses or fertilize cool-season perennials in your pastures. The pastures you create are also a wonderful place to establish complementary forages. If you keep the cows off until these pastures are 6 or 8 inches tall, they will provide excellent forage for use later in the winter or early spring, which will decrease the hay feeding season on the other end and can be used as an early hay or silage crop.

6. Balance a supplement or feeding program that makes sense in your operation. There is no “one size fits all” feeding program for every cowherd. One ranch I work with plans to use hay and cool-season annuals to winter their cowherd. Many ranches I work with plan to utilize poultry litter. There are several operations planning to use crop residues to get them through this tight spot. If you are considering purchasing this product, the price should be adjusted to make cost comparisons with other feedstuffs on an equal moisture and energy basis. For example, if this product costs $100/ton delivered to the farm, its cost per pound of TDN would be $100/(2,000 × 0.68 × 0.42) = $0.175/lb TDN. By comparison, if whole corn is $280/ton, its cost per pound of TDN would be $280/(2,000 × 0.90 × 0.88) = $0.177/lb TDN. In this example, it is just as economical to purchase corn as a substitute energy source.

The 2011 drought is resulting in livestock producers making tough decisions in an effort to minimize the number of livestock that may be sold to try to balance feed resources with animal inventory. As a result, various hay alternatives are being considered to cope with limited forage supplies. This article discusses the nutrient composition and feeding concerns with feedstuffs being considered in Arkansas and throughout the South.

Sugarcane Bagasse

This is a high-fiber residue byproduct from the sugarcane industry. The product coming into Arkansas is high moisture (≈50 percent). This product is low in protein and high in fiber (resulting in a moderate to low digestibility). Producers considering feeding this will need to balance the diet with feedstuffs that are high in both crude protein (CP) and total digestible nutrients (TDN). The product is also very low in phosphorus. When stored in a manner that excludes oxygen (stacking and packing) to prevent decay. Some livestock producers have indicated they may mix this with broiler litter before ensiling. This is not recommended without a moisture analysis of the cane product and litter because the mix could result in a dryer mix, creating an environment more susceptible to heating versus preserving.

Corn Residue

Corn stalks are another option being discussed among livestock producers. Corn stalks recently analyzed at the Southwest Research and Extension Center near Hope, Arkansas, averaged 7 percent CP and 48 percent TDN. Several years ago, a Feedstuffs article reported the nutrient composition of crop residues. The article partitioned the corn residue into grain, leaf, husk, cob and stalk. The reported leaf material averaged 7 percent CP and 58 percent digestibility, but the stalk averaged 4 percent CP and
51 percent digestibility. If baled corn residue is fed to cattle, it would be beneficial to feed an excessive amount to allow cattle to selectively consume the more palatable and digestible components of the residue. However, the cost of feed waste must be considered with any feeding decision. If baled corn crop residue costs $25/bale by the time it arrived at the farm, the bales weighed 1,000 lb, there was 60 percent feeding waste, and the consumed portion was assumed to be 55 percent TDN, the cost per pound of TDN in this example would be $25/(400 \times 0.88 \times 0.55) = $0.129.

Corn stalks should be tested for nitrates before baling. County Extension agents across the state have used a qualitative (diphenylamine/sulfuric acid) quick test on corn stalk samples, and agents are reporting that these samples are testing positive for nitrates. A follow-up quantitative test would be warranted to determine if the nitrate content was dangerously high and if stalks could be limited in the diet to keep total nitrate-nitrogen below 1,000 ppm.

**Grain Sorghum Residue**

Grain sorghum or milo residue is low CP (5 to 7 percent) and moderate TDN (55 to 60 percent) and would require protein supplementation and energy supplementation for lactating beef cows. Similar to corn stalks, milo stubble should be tested for nitrates before baling.

**Rice Stubble**

Rice straw is low protein (4 to 5 percent) and low TDN (40 to 45 percent). Both protein and TDN may be improved with field contaminants of crabgrass, barnyardgrass and other grasses that develop before stubble harvest. Rice straw is very high in silica. Cattle usually do not find rice stubble palatable. Producers who have tried feeding rice stubble in the past report that cattle do not readily consume rice stubble hay. Research with rice stubble as an animal feed has focused on ammonia and enzyme treatments to make the fiber more digestible.

**Soybean Hay**

Baling soybeans has been discussed among farmers; however, the price of beans has resulted in most deciding to harvest for grain, even if low yields are expected. Quality losses with soybean hay can occur at harvest if leaf shatter is high. Soybean crop residue can be as low as 4 percent CP and 35 percent TDN; whereas, soybean managed and harvested as hay averages 15 percent CP and 60 percent TDN.

**Gin Waste**

Cotton gin trash is another roughage alternative that livestock producers sometimes consider when stretching a short hay supply. Gin waste can be quite variable in nutrient composition depending on the amount of cottonseed present. Gin trash samples analyzed at Dairy One (Ithaca, NY) average 12.4 percent CP and 43 percent TDN.

**Crop Chemical Residues**

Anyone purchasing a crop residue should be aware that chemicals used in crop management that are not approved for forage crops results in off-label use of that crop if chemical residues are present. As a result, rice straw and gin waste, in particular, are not recommended as livestock feeds.

**Poultry Litter**

Poultry litter, more specifically broiler litter, has been used for decades as a hay substitute during short forage supplies in Arkansas. Broiler litter contains 23 percent CP and 49 percent TDN on average. The legality of feeding broiler litter became a concern several years ago with issues of poultry feed containing ruminant meat and bone meal. During that time, laws regarding rendering of carcasses from ruminants into protein meals were modified to exclude “specified risk material” associated harboring the BSE linked prion. As a result, feeding broiler litter did not become illegal. Producers, however, must exercise caution when feeding broiler litter. Although rendered ruminant meal and bone meal should not contain “specified risk material,” litter from poultry-fed ruminant meat and bone meal should not be fed to cattle.

Poultry management has changed over the past 15 to 20 years. Today, litter may be windrowed between flocks, and changes in watering systems can result in drier litter than traditional, which could affect the amount of time litter needs to be deep stacked before feeding.

Poultry litter is also being treated with chemicals to control ammonia. If houses are being treated with Alum, litter should be limited to no more than 50 percent of total diet. Feeding high rates of litter (70 to 80 percent of the diet) for a long period of time prior to calving can result in milk fever at near parturition. Adding calcium to litter would not help reduce milk fever. Limiting litter to 50 percent of the diet has traditionally helped reduce the risk of milk fever.

Bird health management is also different today. To avoid any potential for antibiotic residues in the food supply, poultry litter should not be fed to dairy cattle. Beef cows that will be sold because of this drought will likely be sold for slaughter instead of replacements. As a result, beef producers should also exercise caution if using poultry litter and should not feed litter if liquidating cows appears inevitable.

**Rice Mill Feed and Rice Hulls**

Rice mill feed is a mix of rice bran and rice hulls. Rice mill feed is low in CP (6.8 percent) and TDN (42 percent), but quality can be quite variable depending on the ratio of rice hulls and rice bran. Rice mill feed has a small particle size and can be used to manage dietary protein and energy, but due to the small particle size, rice mill feed is not very effective for maintaining rumen health. Therefore, diets with rice mill feed should also be fortified with some hay or cottonseed hulls. Rice hulls are extremely low in protein and energy. They can lower the dietary protein and energy content of high-concentrate feeds that will be used to substitute for forage. Rice hulls should not be greater than 15 percent of the diet. Research with growing cattle has shown that using rice mill feed instead of poultry litter results in greater average daily gains.

**Additional Considerations**

As is evident in the quality of all these forage substitute options livestock producers are considering, TDN will be
deficient for cows in most stages of production and CP will also be deficient in most situations. Livestock producers considering these options as cheap alternatives may discover that they are the most expensive options if the protein and energy deficiencies are not corrected by substituting into the diet feedstuffs high in CP and TDN.

Livestock producers who have 25 to 50 percent of their normal hay supply in inventory should also consider limit-feeding hay and utilizing more expensive, high-quality feedstuffs. For example, a producer who has enough hay (12 percent CP and 55 percent TDN) to meet 50 percent of hay needs for 180 days with expectations of having small grain pasture in the spring is considering sugarcane byproduct $100/ton, corn gluten feed (CGF) $250/ton and hominy $280/ton. Option 1 could be to feed the hay for 90 days and the cane/CGF/h hominy for 90 days. The hay cost has already been incurred through harvest; the other feeds will be purchased. With cane, 9 lb of CGF will be required to balance protein and energy needs for a purchased feed cost of $255/cow. If the cows are limit-fed hay – restricting intake to approximately one-half of expected daily consumption and given 8 lb/d of CGF or 5 lb CGF plus 3 lb hominy, the total cost is $180 to $190 per cow. The moral is limit-feeding higher quality feedstuffs may be more economical than full-feeding lower-quality feedstuffs that require supplementation to balance the cows CP and TDN requirements.

As a final note, have whatever hay substitute you choose to use tested for nutrient composition to develop a feeding program suited to maintain herd productivity.