Producing Summer Annual Grasses for Emergency or Supplemental Forage

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Introduction

Making money with livestock in Kentucky usually depends on farmers’ ability to grow their own feed. Buying forages, even for short periods of time, can make the difference between a profit and a loss.

Farmers depend on stored forages during the winter and cool-season forages, such as fescue and red clover, in the spring and fall. However, during the hot months of July and August, there is often a shortage of good quality forage. Farmers can reduce this problem by:

- limiting the number of animals
- renovating pastures with legumes
- following a good soil testing and fertilizer program
- practicing rotational grazing
- using alfalfa, lespedeza, or clover/grass mixtures for summer grazing
- using warm-season grasses for rotational grazing

Summer annual grasses should be considered as temporary solutions to summer forage needs. They are expensive to produce, difficult to manage, and have a potential for prussic acid and/or nitrate poisoning of livestock. However, if properly managed, they can provide high yields of good quality forage in a short period. Good possibilities are where other seedings have failed or on sites such as sink holes and low areas that stay wet until late spring.

The most efficient and economical use of these grasses is in a management-intensive rotational grazing system. Animals should be given access to only what they can eat in one to three days. Longer rotations result in a much lower efficiency of utilization. A green chop system of harvesting utilizes the highest percentage of the crop but is much more expensive. Warm-season annual grasses can be harvested as hay, but the thick stems dry slowly. A hay conditioner that crushes the stems speeds drying and usually results in better quality hay.

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Plant Types

Sudangrass and sudangrass hybrids are rapidly growing annual grasses of the sorghum family. They are medium yielding and well suited for grazing. They regrow quickly after harvest and can be grazed several times during summer and early fall.

Sorghum x sudangrass hybrids are more vigorous and higher yielding than sudangrass. They are more likely to contain toxic levels of prussic acid and are difficult to cure as hay.

Milletss are small-seeded, fast-growing summer annual grasses. They have smaller stems and are more leafy than the sorghum-type plants. Although they are lower yielding and somewhat slower growing, they do not have a problem with prussic acid poisoning. There are several types: pearl, foxtail, Japanese, proso, and brown top. Pearl and foxtail millets are used as forage in Kentucky.

Pearl Millet is higher yielding than foxtail millet and regrows after harvest if a 5-inch stubble height is left. Dwarf varieties, which are leafier and better suited for grazing, are available.

Foxtail Millet (German millet) is shorter growing and finer stemmed. This makes it easier to harvest as hay. However, it is the lowest yielding of the summer annual grasses and will not regrow to produce another harvest. It is a good smother crop to be used before no-till seeding another crop such as fescue or alfalfa. It is also used as a wildlife planting to produce food and cover for doves, quail, and other birds.

Establishment

These crops can be planted from May 1 until the end of July. Of course, later plantings reduce the number of harvests and total yields. Having two or more plantings at different dates can help with managing harvestings. The seed can be broadcast and cultipacked or seeded with a grain drill into a well-prepared, firm seedbed. Seed can also be planted without tillage if a no-till drill is available.

No-till planting usually requires the use of a herbicide to control existing vegetation. This is especially true when seeding into a pasture or hay field. Residual herbicides usually are not needed since these grasses are very competitive once established and growing. Be sure to follow label directions for any herbicides used.

If a grain drill is used for planting, use the lower rates of seed. Seed sizes may vary. If using small seeds, reduce the amount of seed planted.

Summer annuals need a good supply of nutrients to make high yields. Lime, phosphorus, and potassium should be applied according to soil test results. Nitrogen is important and should be added at the rate of 60 to 100 pounds per acre at planting time. If additional harvests are planned, 40 to 60 pounds of nitrogen per acre may be added after each harvest.

Management

For best yield and quality, summer annual grasses must be harvested at the proper stage of growth. The best time is after the plants are at least 18 inches tall and before seedheads appear. Harvest during this time also reduces the chance of prussic acid poisoning from the sudangrass and sorghum x sudangrass hybrids.

Enough animals should be placed on an area to graze the grass down quickly. Try to get it grazed down within a day or a week at most; then move to another area. After grazing, the residue may be mowed to a height of 6 to 8 inches. Be careful not to graze or mow pearl millet too closely because it can be killed. It will take about four to six weeks of regrowth before it is ready for the next harvest. Grazing can be continued until frost is expected.

Do not graze stunted or frost-damaged sudangrass or sorghum x sudangrass hybrids because of the danger of prussic acid poisoning. The best practice is to remove animals from these areas before frost is anticipated. They can be turned back in to eat the residue after a killing freeze and the leaves have turned brown (two or three days later).

In addition to grazing, these crops can be harvested as green chop, silage, or hay. Feeding green chop requires the same precautions as grazing to prevent prussic acid and/or nitrate poisoning. Silage or hay harvests should be made when the plants are in the boot stage. A conditioner must be used to crush the stems to ensure quick drying for hay. Plants usually need to be cut and wilted before being chopped for silage.

There is little danger of prussic acid poisoning with properly cured hay or silage. Nitrate toxicity could be a problem with hay or green chop but is less

<table>
<thead>
<tr>
<th>Seeding Rates for Summer Annual Grasses</th>
<th>Broadcast lbs/A</th>
<th>Drilled lbs/A</th>
<th>Seeds/ft* 8” row</th>
<th>Seeds/ft* 12” row</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sudangrass and Sorghum x Sudan Hybrids</td>
<td>30-40</td>
<td>15-20</td>
<td>12-16</td>
<td>20-25</td>
</tr>
<tr>
<td>Pearl Millet</td>
<td>15-20</td>
<td>8-10</td>
<td>10-14</td>
<td>16-20</td>
</tr>
<tr>
<td>Foxtail Millet</td>
<td>20-30</td>
<td>15-20</td>
<td>50-65</td>
<td>75-100</td>
</tr>
</tbody>
</table>

*Seed sizes vary, so values given here are approximate.
likely with silage. Green chop should be fed soon after it is cut, before it begins to heat.

**Forage Quality**

With good management, performance of cattle fed the different types of summer annual grasses is about equal. A two-year study in Texas compared the performance of weanling steers (500 pounds) at different stocking rates on pearl millet. The highest average daily gain was 2.2 pounds with a stocking rate of 1.5 animals per acre. The best gain per acre was 6 pounds per day at a stocking rate of 3 animals per acre.

The following table shows results of some recent Kentucky research:

<table>
<thead>
<tr>
<th>Forage Protein</th>
<th>ADF</th>
<th>NDF</th>
<th>TDN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Sorghum x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sudangrass</td>
<td>14.9</td>
<td>35.5</td>
<td>65.5</td>
</tr>
<tr>
<td>Foxtail Millet</td>
<td>10.6</td>
<td>39.5</td>
<td>71.1</td>
</tr>
<tr>
<td>Pearl Millet</td>
<td>9.3</td>
<td>37.8</td>
<td>67.3</td>
</tr>
</tbody>
</table>

*First cutting taken at boot stage.

**Potential Animal Health Problems**

The two most frequently reported animal health problems associated with warm-season annuals are prussic acid poisoning and nitrate poisoning.

**Prussic Acid Poisoning.** Certain plants, such as sudangrass and sorghum x sudangrass hybrids, contain cyanide-producing compounds. The amount of the compound in a plant depends on the size and variety of the plant, whether drought conditions are present, and the extent of physical damage caused by hail or frost.

When an animal eats plants containing high levels of these compounds, prussic acid poisoning results. Prussic acid interferes with oxygen utilization. If enough of the poison is present, the animal dies from respiratory paralysis. The blood of an animal poisoned with prussic acid is a characteristic bright cherry red color. Symptoms from smaller amounts of poison include labored breathing, irregular pulse, frothing at the mouth, and staggering.

The risk of prussic acid poisoning can be reduced by following these practices:

- Do not graze wilted plants or plants with young tillers.
- Do not graze after a non-killing frost; regrowth can be toxic.
- Do not graze after a killing frost until plant material is dry (the toxin usually dissipates within 48 hours).
- Do not graze at night when frost is likely. High levels of toxins are produced within hours after frost occurs.
- Delay feeding silage six to eight weeks following ensiling.

**Nitrates.** Under certain conditions, such as high nitrogen fertilization, drought, or sudden weather changes, forage plants can accumulate high levels of nitrates. When these forages are eaten, nitrates are converted to nitrites more rapidly than they can be properly utilized and they are directly absorbed from the digestive tract.

The absorbed nitrites combine with hemoglobin of red blood cells to produce methemoglobin, a form incapable of transporting oxygen. This causes rapid, labored breathing; fast, weak heartbeat; staggering; muscle tremors; and pupil dilation. A brown (chocolate-colored) blood is characteristic of nitrate poisoning.

The same precautions discussed for prussic acid poisoning help prevent nitrate poisoning. However, remember that millet, as well as the sorghums, can cause nitrate poisoning. Also, nitrates will persist in forages cut for hay. If hay is suspected of having high nitrate levels, it should be sampled and tested. Your local County Extension Office can provide information on hay sampling and advice on using hay with high nitrate levels.

**A Special Case:**

**Sorghum Poisoning of Horses**

Horses should NOT be allowed to graze sorghum. An unidentified toxin in sorghum, apparently more common in hybrid strains, occasionally causes spinal cord degeneration and paralysis in horses. A staggering gait and dribbling of strong-smelling urine are common symptoms. There is no treatment, and affected horses seldom recover. Grasses other than sorghum and sorghum hybrids have not been incriminated. Well-cured sorghum hays appear not to be toxic to horses.
Related Publications

AGR-1  Lime and Fertilizer Recommendations
AGR-18 Grain and Forage Crop Guide for Kentucky
AGR-62 Quality Hay Production
AGR-64 Establishing Forage Crops
AGR-86 Growing Lespedeza in Kentucky
ID-74 Planning Fencing Systems for Intensive Grazing Management
ID-97 Grazing Alfalfa
ID-101 Interpreting Forage Quality Analysis Reports