

Double-Crop Silage Production in Kentucky

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The expansion of livestock enterprises on many Kentucky farms is often limited by the amount of land available for producing high-yielding feed crops for silage. Double-cropping land that is suitable for such an intensive cropping system is one means of increasing feed production per acre. Advantages of the double-crop system of silage production are:

- increased total feed production per acre per year,
- possibility of a year-round supply of stored feed, and
- more efficient use of rainfall.

The production of a small grain for silage is a hedge against the effects of unpredictable summertime drought on corn yields since the small grain is produced largely from the more predictable winter and spring rains. Small grain silage can be fed during summer drought stresses on pastures. Soil and fertility requirements for continuous double-cropping land with little or no erosion hazard should be used. This will likely be bottomland and the nearly level, broad ridgetops. Soils on these landscape positions with few physical and chemical limitations will work best. These should be moderately deep to deep soils capable of storing moisture during summer drought periods.

Since two crops per year will be harvested, there will be a heavy fertility stress put on the fields; so for this reason the soil should be brought to a high state of fertility and maintained there. This involves maintaining soil pH between 6.0 and 6.5 and building soil test levels of phosphorus (P) and potassium (K) to around the

high level (60 lb P and 300 lb K) and then maintaining the pH and fertility close to those levels. This will ensure that fertility will not be a limiting factor for long-term high levels of production.

Fall-applied nitrogen (N) for the small grain is usually not needed, but most producers apply some if they use 18-46-0 or 11-52-0 for fall phosphorus applications. An additional topdressing of N should be made on the small grain in late winter or early spring just before growth begins. Total N application on the small grain should not exceed 110 lb/A. Because these soils are deep and well drained, there is little to no advantage to splitting the N application for corn. A single application of N should be applied just before or soon after planting. Much of the required nutrients can be supplied from appropriate use of animal manure on farms with confined animal enterprises.

Phosphorus and potassium needs will be high because of the high amount of removal by the two silage crops. Research has shown that a yield of 20 tons of corn silage per acre and 8 tons of small grain silage per acre would be expected to remove about 320 pounds of potash (K_2O) and 100 pounds of phosphate (P_2O_5) per acre. Potassium removal by the small grain is as high or higher than corn, and for this reason, it is best to apply potassium twice a year—once at the small grain seeding and again before planting the corn. However, enough phosphorus can be supplied once a year to meet the need of both crops. With the large amount of nitrogen necessary per acre per year to get top silage yields, the soil acidity increases faster than in less intensive systems of crop production.

This makes the use of lime on double-cropped fields very important.

A soil testing program for double-cropped fields should be used as a basis for determining what and how much lime and fertilizer are needed. Soil samples should be taken once a year, preferably during August, in order to keep close watch on soil acidity and fertility changes in fields used so intensively. Check with your local Cooperative Extension agent for specific amounts of lime and fertilizer to use, or refer to University of Kentucky Extension publication, AGR-1, *Lime and Fertilizer Recommendations*.

Soil Structure and Organic Matter Content

Contrary to popular belief, double-cropping returns more organic residues to the soil than single-cropped silage. Keep in mind that in silage production, the source of plant residue returned to the soil is the root system and the stalk stubble. This represents about the same total amount of dry matter as is removed in the form of silage.

In double-cropping, two crops of root residues are returned to the soil each year as contrasted to one residue crop being returned in single-cropped silage production. Observations of fields after up to 10 years of continuous double-cropping have shown no indication of “burning out the soil.” However, this cropping system requires many trips over the field with moderate to heavy traffic loads. This could soon result in soil compaction that would reduce silage yields and soil drainage. It is recommended that the field be tested every second year using a penetrometer as described in University of

Kentucky Extension publication ID-153, *Assessing and Preventing Soil Compaction in Kentucky*.

By taking care not to use machinery when the soil is too wet and by applying manure when possible, maintaining soil structure and organic matter content should not be a problem.

Crop Combinations

Corn silage is the principal crop in a double-cropping system, providing high-quality and high-tonnage production for the longer winter feeding system. Small grain, seeded after the corn silage harvest, is the second crop in the system. Grain sorghum can be used instead of corn.

Oats, barley, wheat, or triticale may be used, depending on the location in the state, soil type, and seeding date. Rye is seldom used because it often is ready for harvest before the soil is dry enough to operate machinery and will become quite high in fiber if harvest is late. Barley and oats both require well-drained soil and are less winter-hardy than wheat. On well-drained soils, barley has the advantage of being earlier than oats or wheat, which allows corn to be planted earlier. If triticale is used, care must be taken to select an adapted variety. Wheat is the most universally adapted and most consistent in yield. Yields of small grain silage (50% moisture) have varied from 5 to 12 tons per acre depending on the season and stage of growth at harvest. Some farmers are consistently averaging 8 to 10 tons per acre.

In order to obtain the highest total yields in a double-cropping silage system, a major effort should be made toward maximizing the corn yield. This would mean planting corn before May 15 whenever possible. It is for this reason that barley and early-maturing wheats are the preferred small grains in this system. Although not as desirable in obtaining maximum silage yields, grain sorghum can be planted later than corn and still produce good silage yields.

Corn Hybrids

Selecting well-adapted, high-yielding corn hybrids is critical to getting high corn silage yields. High grain-yielding hybrids (dual-purpose hybrids) are often very good silage hybrids because the ear will account for a large portion of the total tonnage. High grain-yielding hybrids provide an excellent combination of total tonnage and net energy. Leafy hybrids will yield high tonnage but will be lower in energy. Other specialty hybrid types may offer a benefit in feed quality, but they normally yield much lower.

Cornstalk height does not always mean good silage yields. In some of our silage hybrid trials, shorter hybrids with excellent grain yields have provided more total tonnage than taller hybrids with poor grain yields.

Grain Sorghum Varieties

Grain sorghum varieties in the intermediate height range would probably be the most desirable as silage. This would include varieties in the 6- to 7-foot height range.

Small Grain Varieties

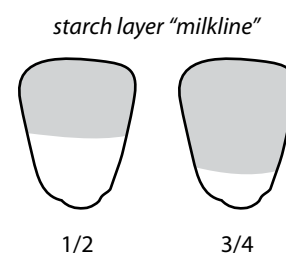
Any of the small grain varieties recommended for grain production in Kentucky are satisfactory for silage. The characteristics of each, such as winter-hardiness, height, leafiness, and earliness, should be studied before one is selected to fit the individual need on your farm. It is generally recommended that the earlier variety of each species be used for double-crop silage.

Variety characteristics of all recommended small grains are published each year in the *Kentucky Small Grain Variety Trial Progress Report* by the University of Kentucky College of Agriculture and is available at all county Cooperative Extension offices. Particular attention should be paid to the heading dates listed in this publication so that an early high-yielding variety can be selected. Starting in 2006, this report also includes forage yields at heading for silage and grain production.

Stage of Harvest

For maximum yield of total digestible nutrients (TDN) and quality, corn should be harvested at the full dent stage when the kernels are about one-half to three-quarters milkline, just prior to blacklayer (Figure 1). Sorghum should be harvested in the late milk to early dough stage. Harvesting of the small grain can be varied somewhat to meet the needs of the individual farm.

Figure 1. The ideal time for corn silage harvest is between one-half and three-quarters milkline.



For highest quality, small grains are harvested in the vegetative stage or when the first heads begin to emerge. After the plant has flowered, the digestibility decreases and remains about constant through the soft dough stage. For maximum TDN production, small grains are harvested at the soft dough stage. The difference in the heading and soft dough stage will probably be about three weeks. Delaying small grain harvest will delay corn planting, likely reducing the yield of corn silage. The reduction in yield of corn silage when planting is delayed beyond mid-May is generally much greater than any gain made by late harvest or by planting a late-maturing variety of small grain.

Small grains should be mowed, conditioned, and wilted to 50% moisture before being chopped and ensiled when they are harvested in the vegetative stage. However, if they are harvested in the soft dough stage, they are dry enough in many cases to be directly chopped.