

# Growing Wheat for Forage

*Jimmy Henning, Chris Teutsch, Ray Smith, and Tim Phillips, Plant and Soil Sciences*

Wheat is a multipurpose crop that can be used for cover crops, stored forage, or grazing. As much as 25% of Kentucky's wheat acreage is used for cover crop or forage rather than grain production. Wheat has excellent winter hardiness and can be sown later in the fall than barley. Wheat is a good choice for planting following corn or soybean harvest to capture residual nitrogen, build soil organic matter, and prevent erosion. Wheat provides high quality growth in early spring, but has limited fall production compared to grazing types of cereal rye.

Wheat is well adapted to most soils in Kentucky, performing best on loamy, well-drained soils having medium to high fertility. Wheat will withstand wetter soils than barley or oats but tends to be less tolerant of poorly drained soils than rye or triticale.

## Soil Fertility Requirements

Forage production from wheat will be best when sites have been limed to a pH of 6.4 or above and fertilized according to soil test recommendations. Nitrogen (N) increases leaf growth and promotes tillering. Phosphorus (P) stimulates early, rapid growth. If needed, apply phosphorus at or before seeding. Potassium (K) promotes standing ability, improved disease resistance and also increases forage yield.

Wheat for Grazing—Total forage production from wheat can be increased by splitting nitrogen applications between fall and spring. For fall grazing, apply 50 to 60 lb N/A at seeding. A late winter or early spring topdressing of 30 to 50 lb N/A will stimulate early growth for additional grazing.

Wheat for hay/silage/baleage—Because harvest for stored forage removes large quantities of nutrients, fields should be soil tested annually to determine need for lime, P and K. Fall-applied N is usually not needed, but most producers apply some if they use 18-46-0 or 11-52-0 for fall phosphorus applications. An addi-



Wheat is a highly versatile crop that can be used for silage or hay production, winter and early spring grazing as well as a cover crop following corn or soybeans.

tional topdressing of N (60 to 80 lb N/A) be made to the small grain in late winter or early spring just before growth begins. Total N application should not exceed 110 lb N/A.

## Establishment

For fall grazing, plant wheat in September as crop rotation and moisture allow. These earlier seedings are prone to infestations by aphids (which vector the barley yellow dwarf virus) and Hessian fly which damage the stem. Hessian fly-free dates vary by year but are October 10 for Northern Kentucky and October 15 for Southern Kentucky. Hessian fly damage is not a concern when you plan to use the crop solely for grazing, since grazing is recommended in the vegetative stage.

For hay/silage/baleage, wheat can be planted throughout October. Planting after October 15 will avoid damage by Hessian fly in most years.

For grazing or stored feed, plant wheat at 2 to 2.5 bushels per acre with seed placed 1 to 2 inches deep. Seeding may be done using no-till drills into crop stubble or existing vegetation or by broadcasting followed by a light disking so seed is covered no more than 2 inches deep.

Wheat may be interseeded into cool season pastures following a dry summer when pastures are very thin and composed predominately of warm season species like crabgrass. Mow or graze these pastures down to four to six inches prior to seeding to remove excess forage residue. This practice can provide fall pasture with early planting and sufficient rainfall.

## Grazing Management

Fall grazing should be delayed until plants are well established (6 to 8 inches tall). Plants grazed before this time will likely be less productive in both fall and spring grazing periods. On the other hand, excessive delay will result in rank, succulent plants which are easily damaged during grazing. Stocking rate should be light enough to avoid continuous complete removal of top growth and to leave a three- to four-inch residual. In wet springs, the risk of trampling and destroying the wheat is greater. Fields should be dry and cattle traffic monitored to avoid trampling and soil compaction.

Rotational grazing has been shown to increase production of small grains similar to perennial pasture grasses. Intermittent grazing should be timed to allow plants to fully recover (6 to 8 inches tall) before the next grazing period.

## Wheat for Grazing and Grain

Wheat may be grazed lightly in the early spring and still provide a reasonable grain crop. Fields to be harvested for grain should not be grazed after the growing point emerges above the soil surface (Feekes 6 growth stage). This stage normally occurs in mid-March when wheat has five to six leaves on the main shoot. To determine if wheat has reached this stage, slice the stem open vertically and observe the location of the developing head. The node, if present, can easily be seen by pulling off the two outermost leaves.

## Hay and Haylage Management

Overall nutritive quality of wheat declines as the stage of maturity advances. Total harvest of nutrients per acre is a compromise between cutting earlier with less yield/higher quality and harvesting later with higher yield/lower quality. For higher quality, cut wheat at the boot to early head stage (Figure 1) rather than bloom stage (Figure 2) or later. Curing conditions are frequently poor when wheat is at boot to early head in Kentucky, making it difficult to dry the crop to safe baling moistures. For this reason, it is common to conserve wheat as high moisture stored forage.



**Figure 1.** Wheat in the early head stage, ideal for harvest as silage or baleage. This stage follows the boot stage where the head is completely enclosed in the leaf sheath.



**Figure 2.** Wheat heads in the bloom stage, showing the exposed anthers.

Wheat can make excellent haylage either chopped into bags or silos or in plastic-wrapped high moisture bales (baleage). Early cut wheat will ensile more readily than later cut forage because it contains higher amounts of readily fermentable carbohydrates. Also wheat in the boot to early head stage forms denser bales that ferment more readily as round bale silage. For baleage, make sure the crop moisture is from 50% to 60%, is baled tightly and wrapped with at least six layers of plastic soon after baling. Adjust wheel rakes so that a minimum of soil is moved into the windrow and captured in the bales.

Early cut wheat is recommended for feeding livestock with high nutrient needs such as growing calves or lactating cows. Harvesting wheat as silage allows earlier planting of double cropped corn or soybeans.

Wheat at the milk to soft dough stage will be of lower quality but can be acceptable for beef cows in mid-gestation with proper supplementation. The stemminess of wheat that has reached the milk to soft dough stage makes poor baleage because of fewer soluble carbohydrates and the difficulty to bale tight enough to

quickly achieve anaerobic conditions for fermentation. Also, awns will stiffen with maturity and can reduce forage intake. For this reason, awnless varieties are desirable when harvesting at later stages of development, i.e. the soft-dough stage (see Figure 3 for views of heads of awned and awnless wheat). Awnedness is not an issue when harvested earlier at the boot stage.

## Nitrate Potential

Occasionally, nitrates can accumulate to toxic amounts in wheat forage. Nitrate accumulation occurs when environmental factors interrupt normal growth and development. These factors include periods of cool cloudy weather, hail damage, frost and drought. The ensiling process will reduce nitrate content about 50%, making toxicity less likely. Toxic levels of nitrate are very unlikely when growth conditions allow normal growth and development.

The University of Kentucky Small Grains Variety Testing Program annually evaluates wheat varieties for differences in forage production potential. This research includes winter cover crop biomass (an



**Figure 3.** Heads of awned (L) and awnless (R) wheat.

The leaf collar region of wheat.

estimate of winter grazing potential), head type listing (awned or awnless) and forage yield potential at the milk to

soft-dough stage. There are substantial differences in forage yield potential among wheat varieties. Variety selection is the simplest, most cost effective way to

maximize wheat forage production. UK Variety Trial info: <http://www.uky.edu/Ag/wheatvarietytest/>.

## Wheat Facts

**Common Name:**  
Wheat

**Scientific Name:**  
*Triticum aestivum* L.

**Origin:**  
Eastern Mediterranean

**Plant Characteristics:**  
A winter annual bunchgrass that grows 2 to 4 feet tall. Has small to medium sized awicles which are hairy. The leaf sheath is not hairy. Medium-length ligule. May or may not have awns.

**Adaptation:**  
Well adapted to Kentucky.

**Major Uses:**  
Hay and silage harvest, (occasionally for grazing). Often double cropped with soybeans and corn for silage.

**Drought Tolerance:**  
Fair

**Soil Drainage:**  
Fair adaptation to poorly drained soils.

**Weight per Bushel:**  
60 lb

**Number of Seed per Pound:**  
11,000

**Seeding Rate:**  
120 to 150 lb/A (2 to 2.5 bu/A). Reduce seeding rates by half in mixtures. If clover is desired, seed 10 lb/A of winter hardy crimson clover (For example, Kentucky Pride).

**Seeding Date:**  
October 1 to 15.

**Seeding Depth:**  
1 to 2 inches.

**Time to First Grazing:**  
When fall growth reaches 6 inches (see Grazing Management below)

**Expected Yield:**  
1 to 2 tons DM per acre at boot stage; 2-4 tons DM at soft-dough stage.

**Nutritive Value:**  
Vegetative to boot, 15 to 22% crude protein and 63 to 68% total digestible nutrients; boot to head, 8 to 12% crude protein and 59 to 63% total digestible nutrients.

**Soil pH:**  
Not tolerant of soil acidity; optimum pH 6.2 to 6.5.

**Fertilization:**  
Apply phosphorus, potassium, and lime according to soil test. For hay or silage, apply limited N at seeding and 60 to 80 lb N/A in late winter or early

spring. For fall grazing apply 50 to 60 lb N/A at seeding followed by a late winter or early spring application of 30 to 50 lb N/A to stimulate early growth for additional grazing.

**Seasonal Distribution:**  
Limited fall growth, with the majority of growth occurring from mid-March to mid-May. Can be mixed with rye for additional fall growth and/or with annual ryegrass to extend grazing in late spring.

**Grazing Management:**  
Graze fall growth if it exceeds 6 inches and stop at 3 to 4 inches. In the spring, initiate first grazing at 4 to 6 inches and stop at 3 to 4 inches. Allow pastures to regrow to 6 to 8 inches before grazing again.

**Hay or Wilted Silage Management:**  
Cut at the boot to early head stage. Wilt to a moisture concentration of 50 to 60% for baleage and 60 to 65% for chopped silage. Wheat can be direct chopped at the soft dough stage.

**Forage Related Disorders:**  
*Nitrate poisoning.* To avoid nitrate poisoning do not apply excessive amounts of nitrogen fertilizer and avoid grazing stressed or slow growing plants such as after a late frost.