K-STATE Research and Extension

# Dual-Purpose Wheat Variety Performance 2025

Wheat Rx Series

To be successful in dual-purpose systems, wheat varieties often require traits that are sometimes overlooked in grain-only systems. These include fall forage yield, date of first hollow stem, recovery potential from grazing, resistance to viral diseases more commonly transmitted when the crop is planted early, no high-temperature germination sensitivity, long coleoptile, and a greater tolerance to low soil pH and aluminum toxicity. This publication, evaluates fall forage yield, date of first hollow stem, plant height, grain yield, and test weight of current varieties in a dual-purpose system versus a grain-only system.

Fall forage yield is an important trait in dual-purpose systems because it sets the potential beef production from wheat grazing in the fall, winter, and early spring. Approximately 100 pounds of beef per acre can be produced for every 1,000 pounds of wheat forage produced per acre. Forage production is dependent on variety selection, planting date, seeding and nitrogen rates, and fall temperature and precipitation.

Date of first hollow stem is also an important trait in dual-purpose systems because terminating grazing at the right time is essential to maintain the grain yield potential for subsequent harvest. Grazing past the first hollow stem can decrease wheat grain yield by as much as 1% to 5% per day.

Depending on environmental conditions, varieties with a shorter vernalization requirement might reach first hollow stem 15 to 20 days earlier than varieties with a longer vernalization requirement. An earlier occurrence of first hollow stem reduces the grazing window into early spring. Date of first hollow stem is dependent on temperature and day length.

Grain yield following grazing is another variety-specific trait of importance in dual-purpose systems. Varieties that rely mostly on fall-formed tillers to produce grain yield generally show a greater yield penalty due to grazing than varieties with a good spring tiller potential.

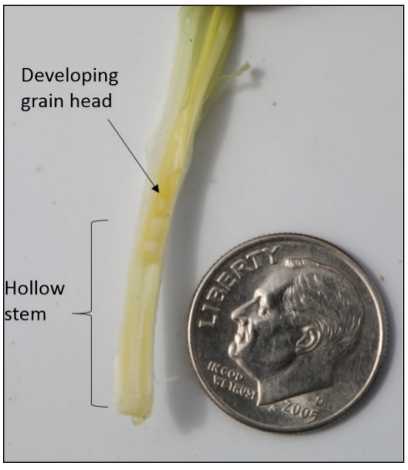


**Figure 1.** *Wheat plant at the first hollow stem stage. First hollow stem occurs when there is approximately 1.5 centimeters (9/16 inch or roughly the diameter of a dime) below the developing wheat head.*

## Description of site and methods

Sixteen commonly grown winter wheat varieties as well as pre-release lines were sown in three neighboring trials in the South Central Experiment Field near Hutchinson, Kansas. Two trials were sown to simulate dual-purpose management, characterized by early sowing date, increased nitrogen rate, and higher seeding rate; while a third trial was sown using the same varieties under grain-only management (Table 1). All plots received 50 pounds per acre of 18-46-00 in furrow at planting, and nitrogen fertilization was performed for a 65 bushels per acre yield goal. Dual-purpose plots received an additional 100 pounds of nitrogen per acre pre-plant to supplement forage production (Table 2). All trials were sprayed with foliar fungicides at heading (May 1, 2025).

One of the two dual-purpose trials was used for destructive measurements to assess forage yield and date of first hollow stem. Forage yield was measured by hand clipping plants approximately ½ inch above the soil surface at two 1-meter by one-row samples within each plot. Samples were then placed in a forced-air dryer for approximately seven days and weighed. First hollow stem was measured six times during the winter and early spring by splitting 10 primary stems collected from each plot one or two times per week. First hollow stem sampling was terminated when 100% of the measured stems had passed 1.5 centimeters of hollow stem below the developing wheat head (Figure 1).

Simulated grazing occurred in the dual-purpose trial during the spring (Table 1). Plots were grazed to a height of about 1.5 inches using a commercial grass mower every time regrowth achieved about 2 inches, which happened seven times during the 2025 season. Simulated grazing was stopped at the average first hollow stem date of the varieties evaluated. Plant height was measured in five plants in each plot. Grain harvest was performed with a small plot combine and grain yield was corrected for 13% moisture content.

*Kansas Wheat Rx is a prescription for economical and sustainable production of high-quality winter wheat in Kansas.*

Wheat Rx is partnership between Kansas Wheat and K-State Research and Extension to disseminate the latest research recommendations for high-yielding and high-quality wheat to Kansas wheat farmers.

KANSAS WHEAT Rx

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**Table 1.** *Seeding rate, dates of sowing, forage harvest, simulated grazing, and grain harvest for three trials evaluating 16 winter wheat varieties under dual-purpose or grain-only management.*

| Trial | Seeding rate | Sowing | Forage harvest | Simulate grazing | Grain harvest |
|---|---|---|---|---|---|
| | -- pounds per acre -- | | date | | |
| Dual Purpose - First Hollow Stem | 120 | 9/20/2024 | 12/12/2024 | | |
| Dual Purpose - Grain Harvest | 120 | 9/20/2024 | | 2/17/2025<br>2/24/2025<br>3/3/2025<br>3/10/2025<br>3/17/2025<br>3/24/2025<br>3/31/2025 | 6/28/2025 |
| Grain Only | 75 | 11/15/2024 | | | 6/28/2025 |

**Table 2.** *Initial soil fertility and soil texture on the study site collected at sowing. Abbreviations: O.M., organic matter; $NO_3$-N, nitrate nitrogen; $NH_4$-N, ammonium nitrogen; CEC, cation exchange capacity.*

| Soil depth | O.M. | pH | $NO_3$-N | $NH_4$-N | P | K | S | Ca | Mg | CEC | Sand | Silt | Clay |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| inches | % | | ppm | | | | | | | Meq/100g | % | | |
| 0-6 | 2.3 | 6.9 | 21 | 21 | 39 | 221 | 9 | 2,871 | 194 | 17 | 28 | 48 | 24 |
| 6-24 | 2.1 | 7.9 | 20 | 33 | 21 | 239 | 9 | 5,639 | 215 | 31 | 26 | 42 | 32 |

## Weather conditions

The fall of 2024 had 7.8 inches of precipitation at the station where the plots were located. This, combined with above-average temperatures, resulted in large forage production by mid-December (Table 3). The winter and early spring were warm and dry, with about 1 inch of cumulative precipitation between January 1 and March 30. A total of 16.9 inches of precipitation accumulated between April 1 and harvest (Figure 2), portraying a wet spring, which, combined with cooler-than-normal temperatures, resulted in good grain yield levels.

## Fall forage yield

Fall forage production of the varieties evaluated ranged from 826 to 1,970 pounds of dry matter per acre, averaging 1,556 pounds of dry matter per acre (Table 3). There were significant statistical differences among the varieties, with AP Sunbird, KS Ahearn, KS Providence, and KS Territory falling into the highest forage-yielding group (range within the highest-yielding group: 1,803 to 1,970 pounds of dry matter per acre).

## First hollow stem

First hollow stem is reported in day of year format. For reference, day of the year 80 is equivalent to March 21. The average occurrence of first hollow stem was day 87 (Table 3), ranging from day of year 82 for early varieties to day of year 89 for late varieties. These dates represent a normal to slightly delayed release from winter dormancy. The range in first hollow stem was narrow, with all studied varieties reaching first hollow stem within a 7-day interval. Four varieties reached it early (AP24 AX, Kivari AX, Sheridan, and AR Turret 25), and all remaining varieties were past this stage at the subsequent measurement. Previous reports of the first hollow stem from Oklahoma have shown that early varieties may reach first hollow stem as

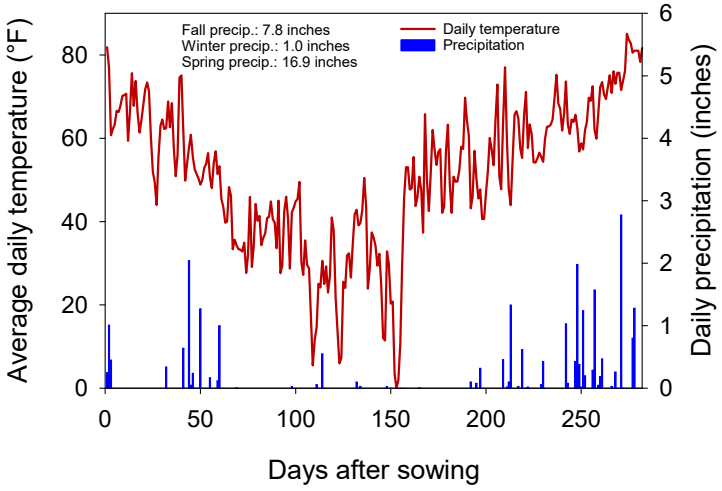


**Figure 2.** *Observed weather during the 2024-25 growing season in the South Central Experiment Field near Hutchinson, Kansas. Weather data are average daily temperature and cumulative daily precipitation from September 20, 2024 until June 28, 2025.*

**Table 3.** *Fall dry matter forage yield, date of first hollow stem, and plant height under grain-only (GO) and dual-purpose (DP) systems in Hutchinson, KS, during the 2024–25 production year. Shaded values refer to the highest testing group. Values pertaining to the highest group are highlighted in bold.*

| Variety | Source | Fall forage yield | First hollow stem | Plant height | | |
|---|---|---|---|---|---|---|
| | | | | GO | DP | diff. |
| | | --- pounds per acre --- | Day of year | ----- inches ----- | | |
| AP24 AX | Agripro | 1,632 | 82 | 28.8 | 24.0 | 4.7 |
| AP Sunbird | Agripro | **1,803** | 89 | 26.8 | 25.1 | 1.7 |
| CLH10-153.022 | | 1,835 | 89 | **39.3** | **31.9** | 7.4 |
| CLH10-1853.014 | | 1,426 | 89 | **33.0** | 28.3 | 4.7 |
| KS Ahearn | KWA | **1,881** | 89 | 27.6 | 26.2 | 1.3 |
| KS Bill Snyder | KWA | 1,481 | 89 | 27.6 | 28.4 | -0.8 |
| KS Mako | KWA | 826 | 89 | 28.0 | 29.3 | -1.3 |
| KS Providence | KWA | **1,970** | 89 | 29.5 | 26.9 | 2.6 |
| KS Territory | KWA | **1,856** | 89 | 29.7 | 26.3 | 3.3 |
| KS21H36 | KWA | 1,682 | 89 | 28.7 | 24.7 | 4.0 |
| Kivari AX | Plains Gold | 1,310 | 82 | 30.1 | 27.3 | 2.7 |
| Sheridan | Plains Gold | 1,511 | 82 | 29.0 | 28.8 | 0.2 |
| AR Iron Eagle 22 AX | Armor Seed | 1,161 | 89 | 27.1 | 26.4 | 0.7 |
| AR Turret 25 | Armor Seed | 1,658 | 82 | 28.2 | 27.6 | 0.6 |
| CP7017AX | Croplan | 1,154 | 89 | 28.8 | 27.2 | 1.6 |
| CP7869 | Croplan | 1,710 | 89 | 29.5 | 28.1 | 1.4 |
| Average | | 1,556 | 87.3 | 29.5 | 27.3 | 2.2 |
| Minimum | | 826 | 82.0 | 26.8 | 24.0 | -1.3 |
| Maximum | | 1,970 | 89.0 | 39.3 | 31.9 | 7.4 |

much as 30 days earlier than later varieties, depending on environmental conditions. Kansas results may differ from Oklahoma results due to cooler winter temperatures holding crop development across varieties, and its interaction with photoperiod as day lengths were already long when temperatures were warm enough to allow for crop development.

## Plant height

Varieties and cropping systems also differed significantly in plant height (Table 3). Plant height in the grain-only system averaged 29.5 inches, ranging from 26.8 to 39.3 inches. This average was -1.3 to 7.4 inches taller than the heights measured in the dual-purpose system (27.3 inches average height with a range of 24.0 to 31.9 inches).

## Grain yield and grain test weight in grain-only or dual-purpose systems

Average grain yield in the grain-only trial was 58.0 bushels per acre, whereas the dual-purpose trial averaged 45.6 bushels per acre (Table 4). Varieties that yielded statistically better than their counterparts in the grain-only trial were AP Sunbird, KS Bill Snyder, KS Mako, KS Providence, KS Territory, Sheridan, AR Iron Eagle 22AX, CP7017AX, and CP7869. The yield penalty from simulated grazing averaged 12.4 bushels per acre and ranged from 2.1 to 23.0 bushels per acre. The variety KS Bill Snyder was the highest yielding variety of the dual-purpose trial. The weather conditions — characterized by cool and moist grain fill weather — benefited some of the later-maturing wheat varieties this season.

Test weights ranged from 54.3 to 61.7 pounds per bushel in the grain-only system and from 51.7 to 60.9 in the dual-purpose system (Table 4). Varieties with the highest test weight at both grain-only and dual-purpose systems were KS Bill Snyder, KS Mako, KS Territory, and Sheridan, whereas the varieties AP Sunbird, AR Iron Eagle 22AX, and CP7017AX were in the highest test weight group under grain-only, and AP24 AX and KS Providence were in the highest test group in the dual-purpose trial.

**Table 4.** *Winter wheat grain yield and grain test weight in grain-only (GO) and dual-purpose (DP) systems in Hutchinson, KS, during the 2024-25 production year. Shaded values refer to the highest testing group. Values pertaining to the highest group are highlighted in bold.*

| | | Grain yield | | | Test weight | | |
|---|---|---|---|---|---|---|---|
| **Variety** | **Source** | **GO** | **DP** | **diff.** | **GO** | **DP** | **diff.** |
| | | --------- bushels per acre ---------- | | | --------- pounds per bushel --------- | | |
| AP24 AX | Agripro | 57.9 | 40.2 | 17.7 | 58.9 | **58.6** | 0.2 |
| AP Sunbird | Agripro | **61.9** | 39.7 | 22.2 | **60.1** | 55.7 | 4.4 |
| CLH10-153.022 | | 30.0 | 30.7 | -0.7 | 55.2 | 55.3 | -0.1 |
| CLH10-1853.014 | | 36.7 | 23.1 | 13.6 | 54.3 | 51.7 | 2.6 |
| KS Ahearn | KWA | 59.0 | 40.6 | 18.4 | 59.2 | 57.6 | 1.6 |
| KS Bill Snyder | KWA | **64.1** | **66.2** | -2.1 | **61.7** | **60.9** | 0.8 |
| KS Mako | KWA | **66.0** | 56.2 | 9.8 | **61.6** | **60.3** | 1.4 |
| KS Providence | KWA | **60.1** | 41.3 | 18.8 | 59.7 | **60.0** | -0.3 |
| KS Territory | KWA | **67.5** | 48.4 | 19.1 | **61.0** | **59.7** | 1.3 |
| KS21H36 | KWA | 58.5 | 49.3 | 9.1 | 58.3 | 58.0 | 0.4 |
| Kivari AX | Plains Gold | 59.1 | 48.6 | 10.4 | 59.4 | 58.4 | 1.0 |
| Sheridan | Plains Gold | **60.1** | 53.8 | 6.2 | **60.7** | **58.9** | 1.8 |
| AR Iron Eagle 22AX | Armor Seed | **66.0** | 43.0 | 23.0 | **60.4** | 58.4 | 2.0 |
| AR Turret 25 | Armor Seed | 54.0 | 50.7 | 3.3 | 59.4 | 57.9 | 1.5 |
| CP7017AX | Croplan | **63.3** | 56.1 | 7.3 | 59.9 | 57.6 | 2.2 |
| CP7869 | Croplan | **63.8** | 41.2 | 22.6 | 59.4 | 57.8 | 1.6 |
| Average | | 58.0 | 45.6 | 12.4 | 59.3 | 57.9 | 1.4 |
| Minimum | | 30.0 | 23.1 | -2.1 | 54.3 | 51.7 | -0.3 |
| Maximum | | 67.5 | 66.2 | 23.0 | 61.7 | 60.9 | 4.4 |
| Maximum | | 62.4 | 55.5 | -6.9 | 62.7 | 61.7 | 0.1 |


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