Issue 1075

K·STATE
Research and Extension

Extension Agronomy

# eUpdate

*10/09/2025*

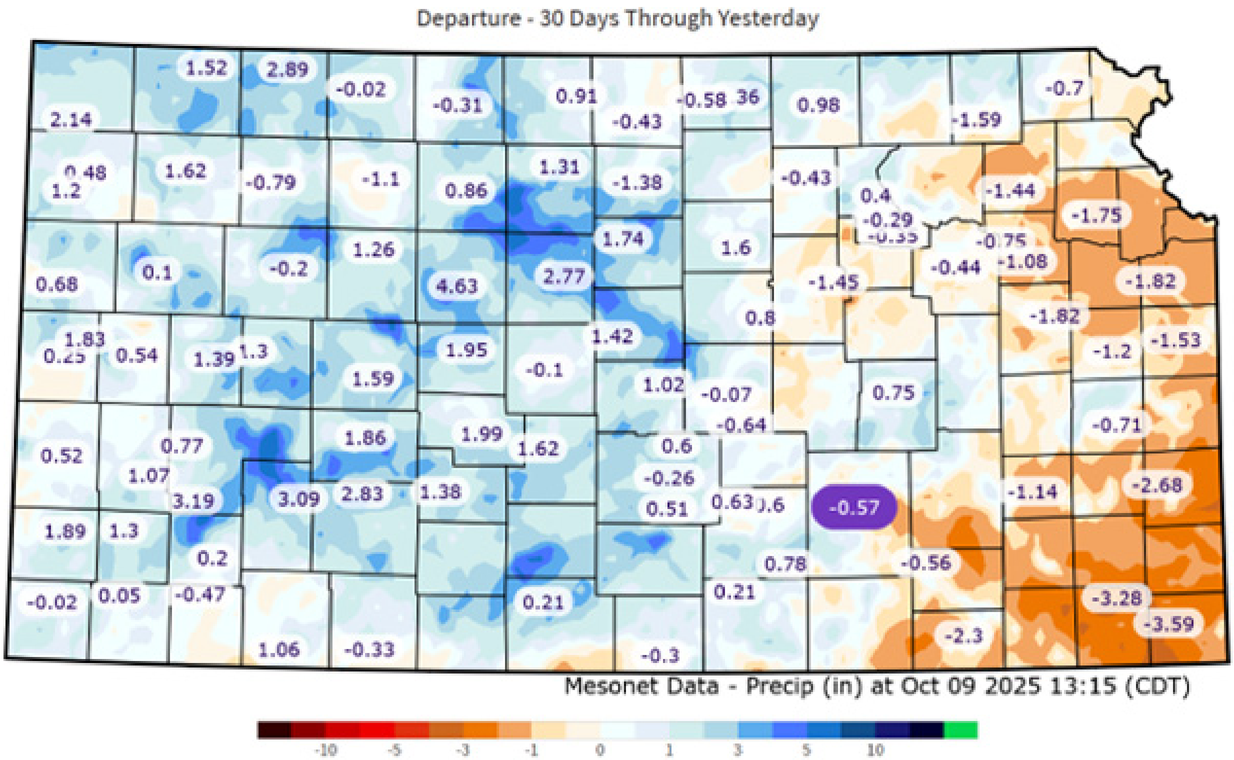
These e-Updates are a regular weekly item from K-State Extension Agronomy and Kathy Gehl, Agronomy eUpdate Editor. All of the Research and Extension faculty in Agronomy will be involved as sources from time to time. If you have any questions or suggestions for topics you'd like to have us address in this weekly update, contact Kathy Gehl, 785-532-3354 kgehl@ksu.edu, or Dalas Peterson, Extension Agronomy State Leader and Weed Management Specialist 785-532-0405 dpeterso@ksu.edu.

Subscribe to the eUpdate mailing list: https://listserv.ksu.edu/cgi-bin?SUBED1=EUPDATE&A=1

# eUpdate Table of Contents | 10/09/2025 | Issue 1075

## 1. Wheat planting conditions in Kansas: Middle of October 2025

Early September brought much-needed precipitation across Kansas, with regions of the state accumulating up to 5 inches more than normal, while isolated areas of eastern Kansas received below-average rainfall amounts (Figure 1). These events, for the majority of the state, improved soil moisture conditions at least temporarily, which is positive for wheat planting. While early September added decent precipitation totals, the last two weeks were predominantly drier. Recent warm and breezy conditions can rapidly reduce soil moisture in both the first (September) and second (October) sunniest months in the state. Over the last week, soil moisture has slightly decreased, with negative changes observed at the 4-inch (10-cm) depth (Figure 2).



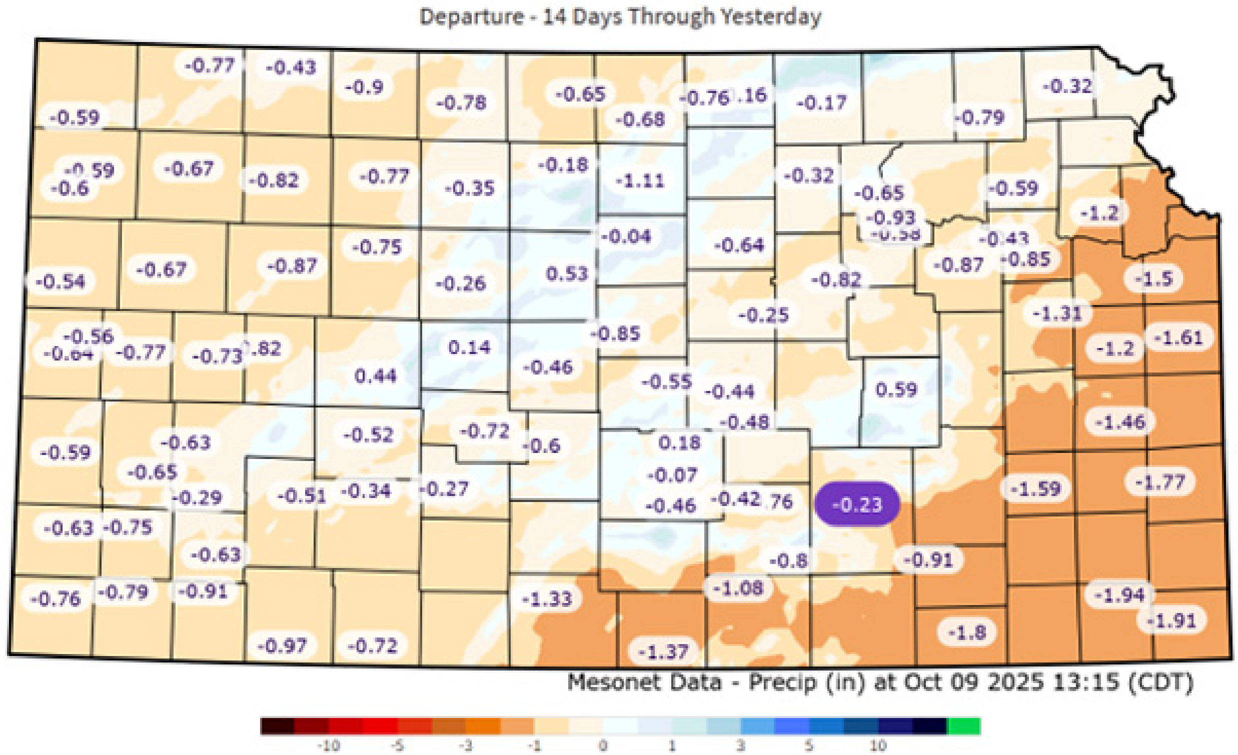



**Figure 1. Departure from normal precipitation over the last thirty days (upper panel) and fourteen days (lower panel) ending on 8 October 2025. Map by the Kansas Mesonet.**

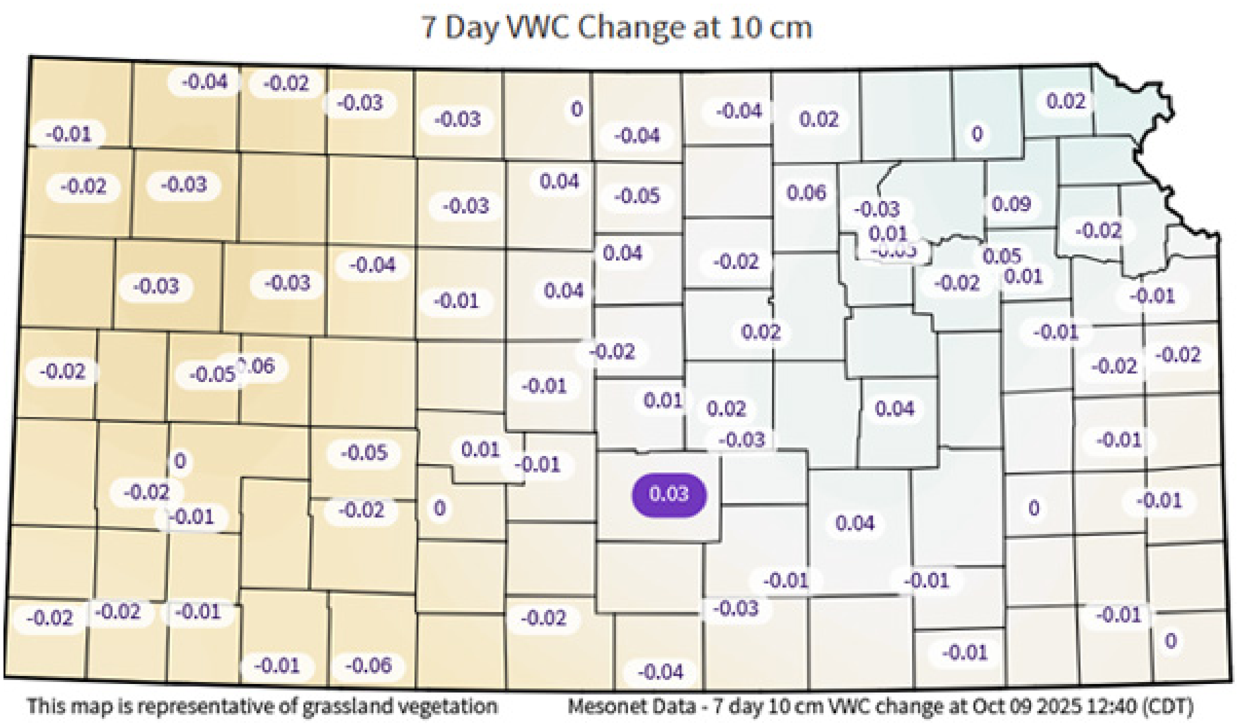



**Figure 2. Change in volumetric water content at the 4-inch soil depth (10 cm) over the last seven days, as of October 9, 2025. Map by the Kansas Mesonet.**

**Weather forecast**

Kansas's next 7-day precipitation forecast indicates that the region may experience below-average moisture, with only small areas of limited moisture (Figure 3). Totals are only expected to be generally less than 0.50 inches, with many not observing moisture. Average weekly precipitation ranges from 0.3 inches in the west to 0.9 inches in the southeast. The 8- to 14-day forecast slightly favors an increased probability of above-normal precipitation statewide, with the highest probability in the northwest part of the state (Figure 4).

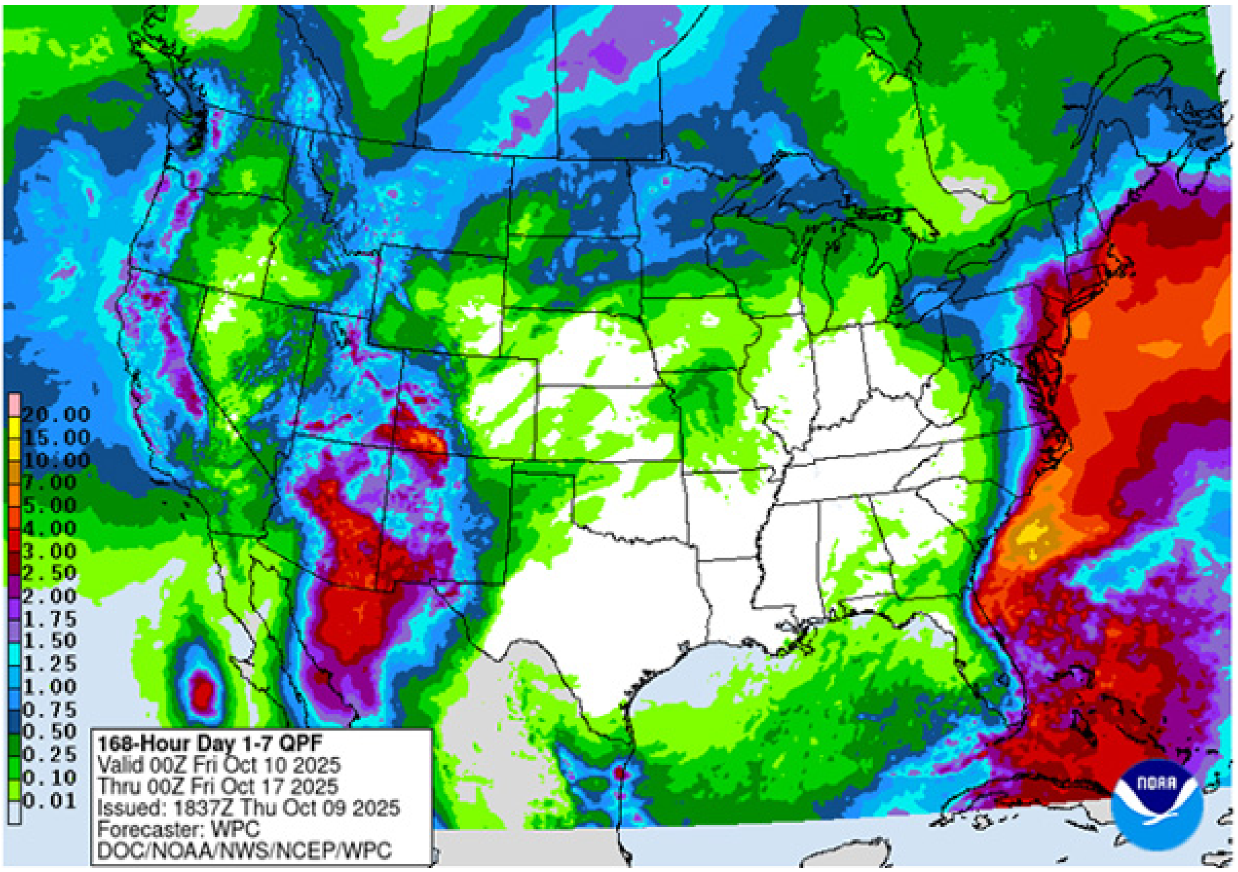



**Figure 3. Weekly precipitation forecast as of October 9, 2025, by the National Weather Service Weather Prediction Center (NOAA). For the next seven days, forecasted precipitation amounts in Kansas range from <0.1 to ~0.75 inches, with locally higher amounts possible.**

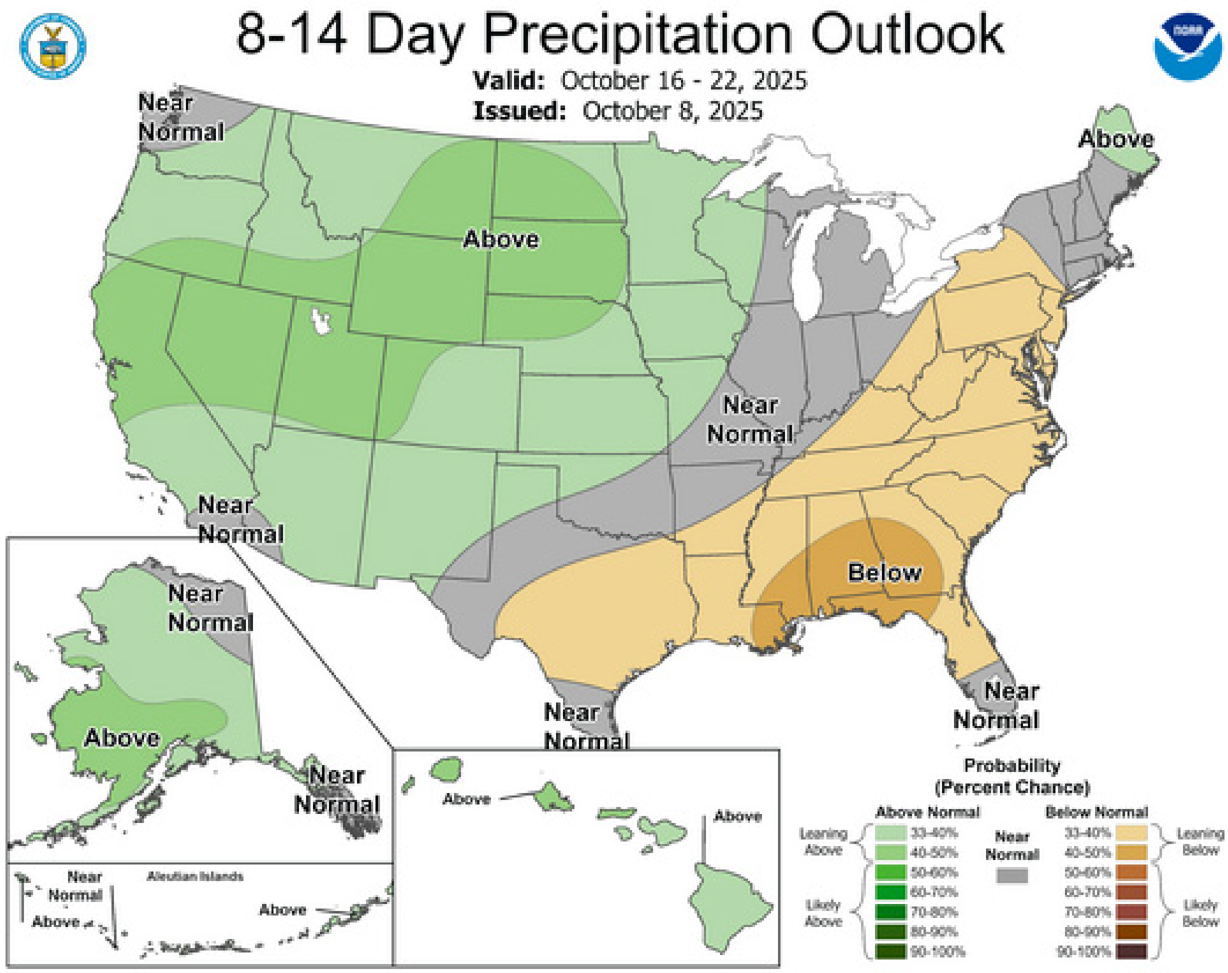



**Figure 4. The 8- to 14-day precipitation forecast as of October 9, 2025, by the Climate Prediction Center, NOAA.**

**Continue planting progress to ensure crop establishment at the optimum time**

For the majority of the state, planting conditions are suitable for growers to continue planting and ensure the crop is established at the optimal time. The only exception is northwest Kansas, where the optimum planting dates for wheat are in late September. At this time, growers are encouraged to adjust their agronomic practices if planting wheat late.

Some growers in southwest Kansas, where some of the precipitation was missed and soils are dry, may be considering whether to continue planting the crop or wait for rain. There is no one-answer-fits-all solution here, since each grower must consider their own situation before making this decision. At this point in time (October 9), and based on current soil conditions and weather forecasts, the advice would be to continue with crop planting since we are at the beginning of the optimum planting window for most of the state, and there are positive rain chances for most of the state in the 14-day outlook. Continuing to plant now allows for taking advantage of the available moisture where recent rainfall has occurred, and also ensures good seed distribution in drier soils where rainfall has not occurred. In this situation, growers also have the opportunity to plant a large number of acres before it rains. If the short-term forecast changes and more widespread precipitation materializes, this should allow for uniform crop emergence in those regions (especially since the regions where this forecast exists received moisture recently). However, suppose no rain occurs in the near future. In that case, the crops planted now into dry soils in parts of southwest Kansas might not emerge until it rains later in the fall or even winter, delaying the "effective planting date" to whenever the rain occurs. Thus, at this point, growers should start to treat these fields as if they were sowing late, where increases in seeding rate and applications of in-furrow starter fertilizer are recommended. These situations may also be ideal for seed treatments, as the seeds will be exposed to weather in the fields for several days.

The worst-case scenario would include planting into a limited amount of moisture, just enough for the emergence of some plants, but not enough to maintain these seedlings after they emerge. This situation can result in uneven stands and high stand variability within the field (Figure 5), or even crop failure. Thus, if good moisture cannot be reached in about the top 1.5 to 2 inches of soil, growers would likely be better off sowing it shallower and waiting for rain.

From a regional perspective, we are either in the beginning (south central, central, southeast Kansas) or at the peak (north central, southwest) of the optimum planting window, with the exception of northwest Kansas, where we are already past the optimum planting window for wheat. Since we are planting at the optimum window and predominantly with soil moisture, for the majority of the state, there is no need to adjust our practices to compensate for a late emergence other than in northwest Kansas.

For more information on planting wheat into dry soils, please see this previous eUpdate article at https://eupdate.agronomy.ksu.edu/article_new/considerations-when-planting-wheat-into-dry-soil-564-1.

**Figure 5. Uneven wheat stands as a result of sowing into dry soils. Photo by Romulo Lollato, K-State Research and Extension.**


Romulo Lollato, Wheat and Forages Specialist
lollato@ksu.edu

Christopher "Chip" Redmond, Kansas Mesonet Manager
christopherredmond@ksu.edu

## 2. Possible causes of blank heads in grain sorghum

This year in Kansas, several grain sorghum fields exhibit heads that are partially blank or have very small kernels, often affecting the upper portion of the head, although other parts are sometimes involved (Figure 1).

**Figure 1. Field in Reno County (photo taken in a previous growing season). The upper third of the heads is blank and darkened throughout the field. Photos by J. Shroyer, K-State Research and Extension.**

There are a number of possible causes:

**Unusually cool weather at or near the time of pollination:** Studies have shown that cool temperatures during pollen formation can induce male sterility. Pollen formation typically begins as the flag leaf emerges and continues until flag leaf collar development (near the boot stage), well before heading and pollen shed. Night temperatures at or below 55°F during these critical stages can drastically reduce seed set. Poor seed set this season may be related to cool night temperatures that occurred when pollen was forming, around the time of flag leaf emergence.

Once pollination begins, temperatures near 50°F can slow pollen germination and growth. Formed pollen can survive at temperatures below 40°F and remain viable until warmer daytime temperatures allow successful germination. However, cool conditions can still reduce seed set by slowing pollen tube growth to the ovule.

Sorghum flowers from the top of the head downward over several days. Occasionally, a band of poor seed set is observed if pollen shed or growth is inhibited for just one or two days. Because new pollen is shed each day, normal fertilization usually resumes unless cool temperatures persist for a week or more.

**Application of a growth regulator herbicide:** Applying growth regulator herbicides such as dicamba or 2,4-D beyond the labeled height restriction can cause partial or total head sterility. Heads affected by this type of injury often show twisting or distortion.

**Bird damage:** Bird damage is common and typically occurs most severely near tree lines or fences. Damage is usually obvious, with hollowed-out or "blasted" areas where kernels were removed (Figure 2). Droppings on leaves or the soil surface are additional signs.


**Figure 2. Bird damage on a sorghum head (left) can be mistaken for midge damage (right). Bird feeding gives the head a "blasted" appearance. Sorghum midge damage appears as blank zones on the flowering head. Photos by Anthony Zukoff, K-State Research and Extension.**

**Insect damage:** Sorghum midges damage grain by laying eggs during flowering. The larvae feed on developing kernels, each typically destroying one seed. The adult midge is a tiny, red, gnat-like insect attracted only to heads (or parts of heads) that are flowering.

No kernel develops inside glumes where larval feeding occurs, giving the glumes a flattened appearance. Midge damage is often confused with bird damage (Figure 2). After feeding, larvae crawl to the top of the spikelet to pupate. When adults emerge, they leave behind small, weather-resistant pupal cases that may still be visible.

Infested heads usually contain normal kernels scattered among empty spikelets, since midges rarely infest every kernel. Adults live about one day and lay roughly 45 eggs. Although sorghum midges were historically limited to the southeast quarter of Kansas, they have expanded their range and now cause yield losses in late-planted sorghum across the southern two-thirds of the state.

### Diseases and freeze injury

Diseases are unlikely to be the cause of head blanking. While the affected areas often appear darkened or moldy, these symptoms are due to saprophytic fungi that colonize the heads after damage has occurred.

Freeze injury is also not responsible. If no kernels are present, the problem originated during pollination and fertilization. Very small kernels indicate an issue early in the grain-filling period. In either case, the damage occurred well before hard freezes.

### Most likely cause this year

In 2025, the most likely cause of blank or partially blank heads is unusually cool conditions during pollination, especially in fields where the issue occurs uniformly.

**Table 1. Lowest recorded temperatures for the month of August 2025 for selected locations in Kansas.**

| Location | Date | Temperature (°F) |
|---|---|---|
| **Colby** | August 31 | 54.4 |
| **Hays** | August 26 | 53.5 |
| **Tribune** | August 4 | 56 |
| **Garden City** | August 4 | 57.6 |
| **Hutchinson** | August 26 | 52.8 |
| **Belleville** | August 26 | 49.6 |
| **Manhattan** | August 26 | 52.7 |
| **Parsons** | August 27 | 53.1 |

Sorghum begins flowering and pollinating at the top of the head and progresses downward over several days. If cool conditions persist for only one or two nights, only part of the head, or one side, may be affected. This pattern matches what has been observed in many Kansas fields this year.

Lucas Haag, Agronomist-in-Charge, Tribune
lhaag@ksu.edu

Logan Simon, Southwest Area Agronomist
lsimon@ksu.edu

Anthony Zukoff, Instructor of Entomology
azukoff@ksu.edu

Tina Sullivan, Northeast Area Agronomist
tsullivan@ksu.edu

Jeanne Falk Jones, Northwest Area Agronomist
jfalkjones@ksu.edu

## 3. Update on sorghum ergot in Kansas

Last week, the eUpdate featured an article on the appearance of ergot in sorghum, mainly in forage sorghum, in Kansas (https://bit.ly/4pTtEqR). This is a relatively rare event, with notable prior occurrences in 1997 and 2017. Sorghum ergot in the U.S. is caused by the fungus *Claviceps africana*. *Claviceps africana* has been reported in Australia, Central America, North America, South America, and South Africa.

**Two key points about sorghum ergot:**

- Claviceps africana **(which infects sorghum) is not the same pathogen that causes ergot (**Claviceps purpurea**) in wheat, rye, triticale, and fescue.**
- **We are not aware of any issues with toxicity in the past or present in the US caused by the ergot fungus** Claviceps africana **that infects sorghum.**

Additional information about this fungus is addressed in a Frequently Asked Questions article, written by Dr. Brent Bean, Director of Agronomy for the Sorghum Checkoff. The article is available at:

. This article will be updated if more information becomes available.

**Figure 1. Forage sorghum head infected with Sorghum Ergot in Ness County, Kansas. Photo: K-State Research and Extension.**

**Figure 2. Honeydew has dripped from the plant onto the soil surface. Photo taken in Ness County, Kansas.**

**Please help us track sorghum ergot!**

You can contact Rodrigo Onofre directly at 785-477-0171 if you suspect a field has sorghum ergot and/or submit a sample to the K-State Plant Disease Diagnostic Lab at https://www.plantpath.k-state.edu/extension/diagnostic-lab/documents/2021_PP_DiseaseLabChecksheet.pdf.pdf. This will help us monitor the situation in the state.

**Additional resources**

- Sorghum ergot has been detected in Kansas: https://eupdate.agronomy.ksu.edu/article/sorghum-ergot-has-been-detected-in-kansas-666-5
- Texas A&M Sorghum Ergot Factsheet: https://southtexas.tamu.edu/files/2023/05/sorghum-ergot-new-disease-threat-to-the-sorghum-industry.pdf
- UNL Sorghum Ergot Factsheet: https://cropwatch.unl.edu/plant-disease/sorghum/ergot/
- Sorghum Ergot: Distinguishing Sphacelia and Sclerotia of Claviceps africana in Seed: https://cdn-de.agrilife.org/extension/departments/plpm/plpm-pu-021/publications/files/sorghum-ergot-distinguishing-sphacelia-and-sclerotia-of-claviceps-africana-in-seed-.pdf

Rodrigo Onofre, Row Crop Pathologist
onofre@ksu.edu

Lucas Haag, Agronomist-in-Charge at Tribune
lhaag@ksu.edu

Jeanne Falk Jones, Northwest Area Agronomist
jfalkjones@ksu.edu

Logan Simon, Southwest Area Agronomist
lsimon@ksu.edu

Tina Sullivan, Northeast Area Agronomist
tsullivan@ksu.edu

John Holman, Cropping Systems Agronomist
jholman@ksu.edu

Brent Bean, Agronomist, United Sorghum Checkoff

## 4. Fall fertilization of smooth brome and tall fescue

Smooth brome requires annual fertilization for optimum production. Fall is an ideal time to plan for fertilizing cool-season improved pasture perennial grasses, such as smooth brome and tall fescue (Figure 1). Particular attention must be paid to nitrogen, phosphorus, potassium, and pH. More information on fall soil testing of hayfields and pastures was published in this recent eUpdate article: https://eupdate.agronomy.ksu.edu/article/fall-soil-testing-of-hayfields-and-pastures-666-1

Balanced fertility is essential. For example, adding nitrogen will not produce optimum yields if phosphorus is low. Soils low in phosphate limit plant and root growth. Fertilizer should be applied by broadcasting in the fall or before spring growth begins.

**Figure 1. Fall growth of established smooth brome field prior to fertilizer application. Photos by John Holman, K-State Research and Extension.**

**Nitrogen Source.** Nitrogen management is critical for optimum smooth brome production. Several nitrogen sources are available: liquid nitrogen solutions, urea, ammonium nitrate, and anhydrous ammonia. Anhydrous ammonia is not extensively used on permanent pastures because application is difficult. Nitrogen source research generally has shown little difference among sources under most conditions. When urea fertilizers, including liquid nitrogen, are applied to moist soils covered with grass residue, an enzyme called urease can break down the urea to ammonia, which is lost to the air. This can occur fairly rapidly when moist conditions are followed by warm temperatures, and rapid drying occurs without rain to move the urea into the soil. If urea is applied from November through February, volatilization loss should be minimal.

**Application Timing.** When brome is fall grazed , the yearly nitrogen application should be split. If adequate soil moisture is available for good growth in late August and early September, apply all phosphorus and potassium indicated by a soil test plus 30-40 pounds of nitrogen per acre. When applying any fertilizer application, grazing should resume following the fertilizer prills/ pellets have dissolved to reduce livestock concerns. Before the soil freezes in November or December, apply the remainder of the nitrogen recommended for haying or grazing. Split or late fall applications generally initiate earlier green-up in the spring.

If soil moisture is limited, apply all nitrogen, phosphorus, and potassium before the soil freezes in November or December. **To minimize loss, do not apply fertilizer to frozen soil.**

Spring applications should be made as soon as the soil thaws are acceptable for spring-only grazing. Timely application is often delayed because of wet soils. An application needs to be applied in the fall or early spring to allow sufficient time for fertilizer incorporation to benefit forage production (Figure 2).

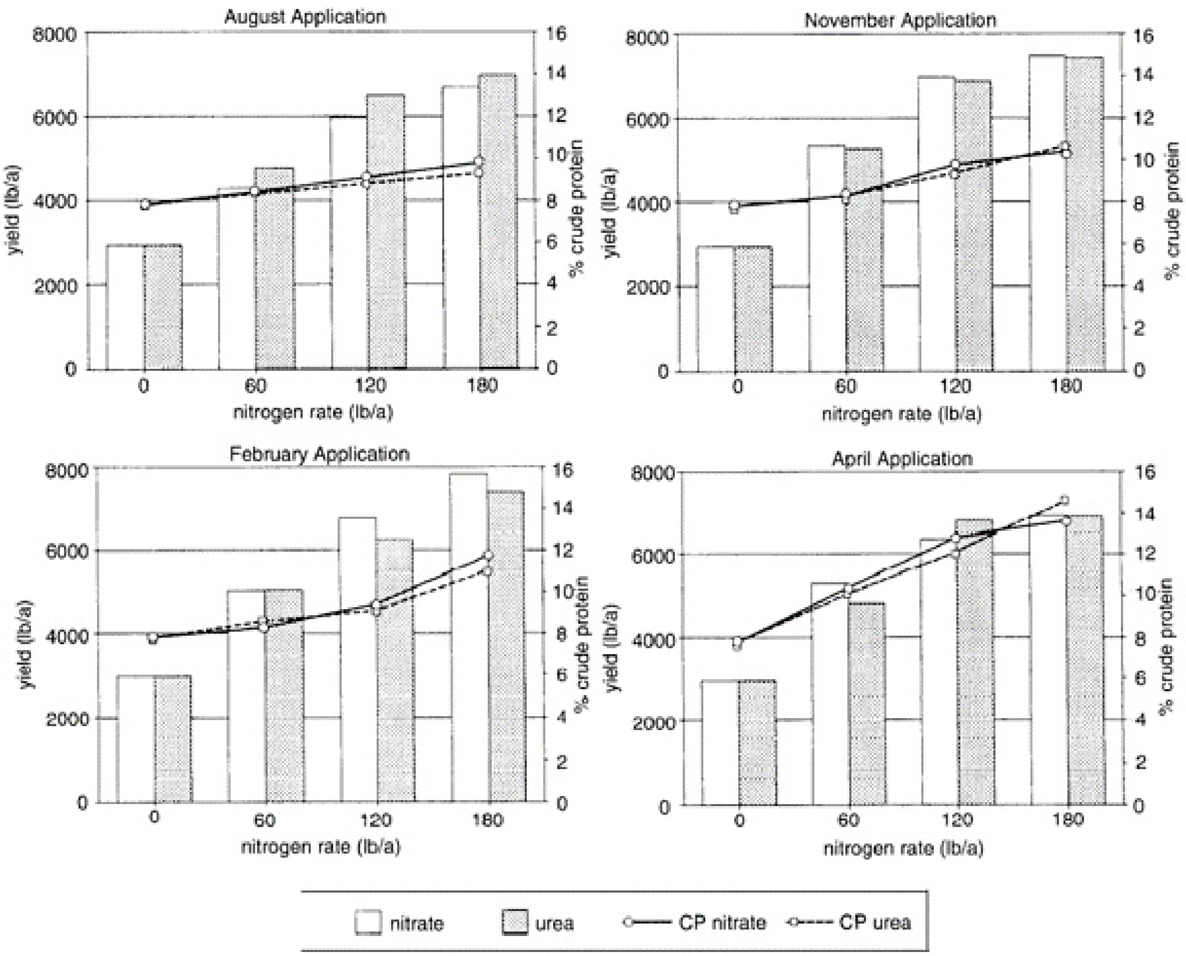



**Figure 2. Timing of N application on smooth brome yield. Source: KSRE publication C402 Smooth Brome Production and Utilization.**

**Fertilizer Rates (N, P, and K).** Fertilizer rate recommendations for N, P, and K for established stands of smooth bromegrass are shown in Tables 1, 2, and 3, respectively. When brome is to be utilized for hay production, excessive N may cause lodging and reduce the amount of harvestable hay. Nutrient rates in all tables are based on soil test values and yield goals. In Table 1, the lower values in the rate range are for hay production. Nitrogen rate should be selected based on factors such as fertilizer cost, hay price, and/or grazing pressure.

Two tons of forage can be hard to visualize, but bales per acre are not. Though not an exact science, as bales vary in weight, a representation of 4 medium round bales or 50 square bales would equate to two tons of forage from the 80 lbs N per acre listed in Table 1.

**Table 1. Nitrogen recommendations[1] for smooth bromegrass and fescue.**

| Expected Yield (tons/acre) | Production (lbs/ac) | New Seedling lb/a N |
|---|---|---|
| 2 | 80 | 20 |
| 4 | 160 | 20 |
| 6 | 240 | 20 |
| 8 | 320 | 20 |
| 10 | 400 | 20 |

[1]Nitrogen rates required at various expected yields. The total N requirements presented only include expected yield adjustments and the total N requirements should be modified for other appropriate adjustments

**Table 2a. Phosphorus recommendations for smooth bromegrass and fescue established stands.**

| | Soil Test Level (ppm P) | | | | |
|---|---|---|---|---|---|
| **Established Stands** | Very Low | Low | Medium | High | Very High |
| Expected Yield (tons/acre) | (0-8) | (9-15) | (16 - 20) | (21 - 30) | (31 or more) |
| | lb/a $P_2O_5$ | | | | |
| 2 | 45 | 25 | 15 | 0 | 0 |
| 3 | 50 | 25 | 15 | 0 | 0 |
| 4 | 55 | 30 | 15 | 0 | 0 |
| 5 | 60 | 30 | 15 | 0 | 0 |
| 6 | 65 | 35 | 15 | 0 | 0 |

**Table 2b. Phosphorus recommendations for smooth bromegrass and fescue new stands.**

| | Soil Test Level (ppm P) | | | | |
|---|---|---|---|---|---|
| **New Stands** | Very Low | Low | Medium | High | Very High |
| Expected Yield (tons/acre) | (0-8) | (9-15) | (16 - 20) | (21 - 30) | (31 or more) |
| | lb/a $P_2O_5$ | | | | |
| 2 | 70 | 35 | 15 | 0 | 0 |
| 2.5 | 75 | 40 | 15 | 0 | 0 |
| 3 | 80 | 40 | 15 | 0 | 0 |
| 3.5 | 85 | 45 | 15 | 0 | 0 |
| 4 | 90 | 45 | 15 | 0 | 0 |

The P recommendations are for the total amount of broadcast and banded nutrients to be applied. If Mehlich-3 P is greater than 20 ppm, then the basic P recommendation is zero. If Mehlich-3 P is less than 20 ppm, then the minimum P recommendation is 15.

**Table 3a. Potassium recommendations smooth bromegrass and fescue existing stands**

| | Soil Test Level (ppm K) | | | | |
|---|---|---|---|---|---|
| **Established stands** | Very Low | Low | Medium | High | Very High |
| Expected Yield (tons/acre) | (0-40) | (40-80) | (81-130) | (131 - 160) | (161+) |
| | lb/a $K_2O$ | | | | |
| 2 | 45 | 30 | 15 | 0 | 0 |
| 3 | 50 | 30 | 15 | 0 | 0 |
| 4 | 55 | 35 | 15 | 0 | 0 |
| 5 | 60 | 40 | 15 | 0 | 0 |
| 6 | 65 | 40 | 15 | 0 | 0 |

**Table 3b. Potassium recommendations for new smooth bromegrass and fescue stands.**

| | Soil Test Level (ppm K) | | | | |
|---|---|---|---|---|---|
| **New Stands** | Very Low | Low | Medium | High | Very High |
| Expected Yield (tons/acre) | (0-40) | (40-80) | (81-130) | (131 - 160) | (161+) |
| | lb/a $K_2O$ | | | | |
| 2 | 100 | 65 | 25 | 0 | 0 |
| 2.5 | 110 | 70 | 25 | 0 | 0 |
| 3 | 115 | 75 | 25 | 0 | 0 |
| 3.5 | 120 | 75 | 25 | 0 | 0 |
| 4 | 130 | 80 | 30 | 0 | 0 |

The K recommendations are for the total amount of broadcast and banded nutrients to be applied. If extractable K is greater than 130 ppm, then basic K recommendations are 0. If the concentration is less than 130 ppm, then a minimum recommendation is 15 pounds.

Dorivar Ruiz Diaz, Soil Fertility Specialist
ruizdiaz@ksu.edu

John Holman, Cropping Systems Agronomist – Garden City
jholman@ksu.edu

Tina Sullivan, Northeast Area Agronomist
tsullivan@ksu.edu

## 5. Management considerations before baling corn residue

Kansas produces approximately 5.5 million acres of corn each year, resulting in more than 10 million tons of corn residue (stover) (Figure 1). Producers may consider baling some of the stover for its economic value as animal feed or bedding material at feedlots and dairies or as a bioenergy feedstock for lignocellulosic ethanol. In fact, crop leaves are often blown off the field into ditches and field edges if not baled or grazed. Although baling crop residues provides additional income, producers should consider the potential impacts that residue removal may have on soil and crop health as well as long-term sustainability.

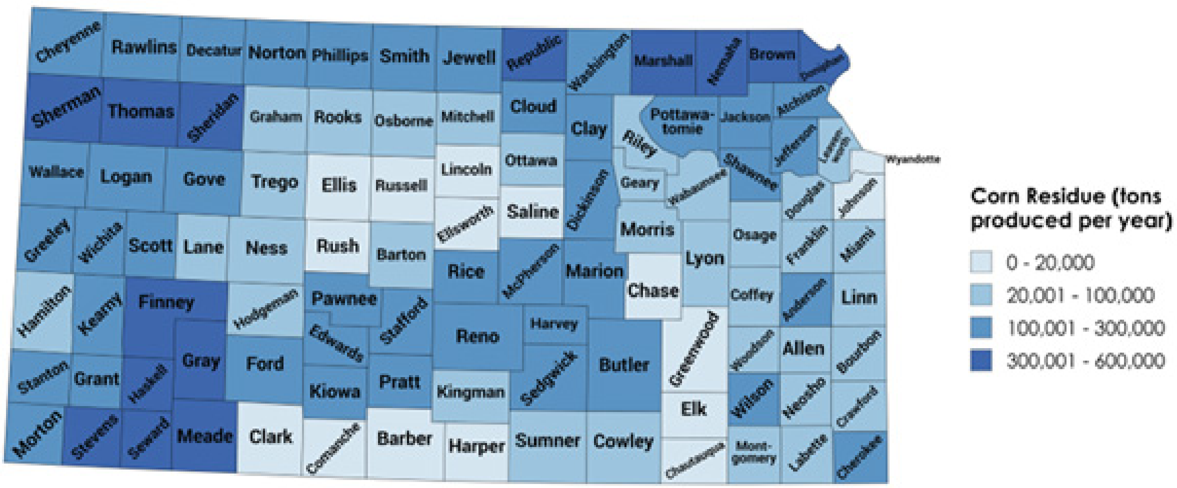



**Figure 1. Estimated tons of corn residue produced per year for each Kansas county. Averages from 2011 to 2020 were calculated from crop yields and harvest index from the National Agricultural Statistics Service.**

Baling corn residue could limit the services that crop residues provide in cropping systems, such as conserving soil moisture, protecting from soil erosion, and cycling nutrients.

**Soil moisture conservation**

Keeping crop residue on the soil surface helps the ground hold more water by improving infiltration from rainfall and irrigation and by reducing evaporation. Residue protects the soil from raindrop impact that can cause surface sealing, ponding, and runoff. It also shades the soil, keeping it cooler and reducing the drying effects of wind and sun.

Researchers from Kansas State University measured soil temperatures at Hugoton, Colby, and Ottawa during the 2010–2011 seasons. Removing 50 to 100% of corn residue increased soil temperatures in summer but lowered them in winter. Overall, soil temperatures fluctuated more where residue was removed, and surface soil water content declined by 5-8%, particularly during the growing season.

**Soil erosion protection**

Bare soil is more vulnerable to wind and water erosion. Crop residue shields the soil from raindrop impact that can detach particles and contribute to runoff. It also slows the wind at the soil surface, reducing particle loss. At Hugoton, Colby, and Ottawa, higher rates of corn residue removal decreased the mean weight diameter of water-stable soil aggregates, indicating reduced soil structural stability (Figure 2).

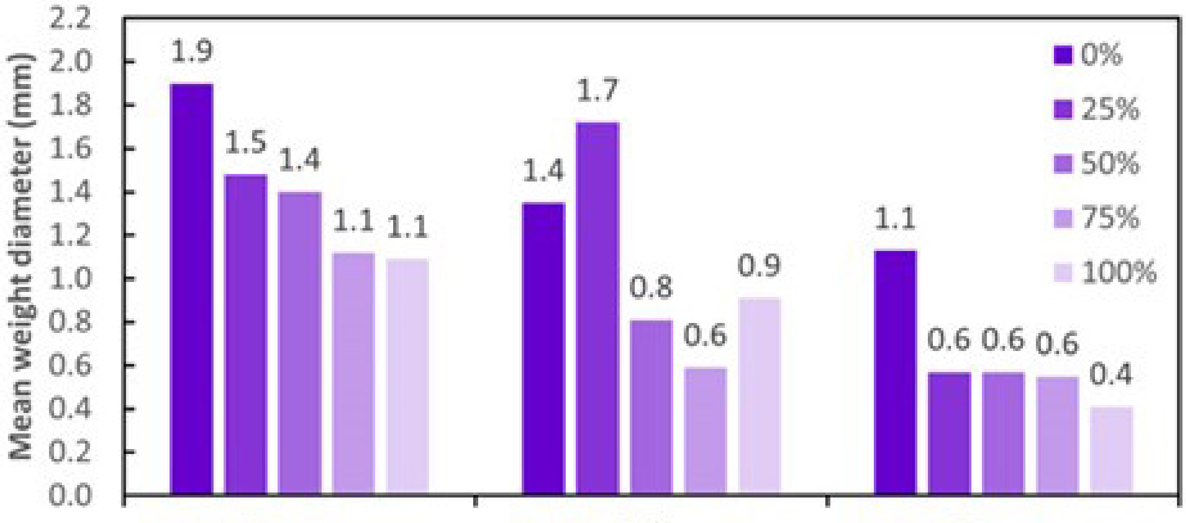



**Figure 2. Impact of corn residue removal on mean weight diameter of water stable aggregates near Hugoton, Colby, and Ottawa, Kansas in 2012.**

Water erosion from croplands increases sedimentation in rivers, lakes, and reservoirs, threatening aquatic wildlife, raising flood risks, and requiring costly dredging operations for remediation. Wind erosion also poses risks, degrading air quality and impacting human and animal health, particularly for individuals with respiratory conditions. In addition, dust from wind erosion can reduce visibility, contributing to traffic accidents (Figure 3), and can damage machinery through abrasion and clogging.

**Figure 3. Soil piled up along a fence line in west central Kansas following a series of wind erosion events. Photo by Augustine Obour, K-State Research and Extension.**

Topsoil loss degrades soil productivity, especially in the long term. Most agricultural soils in Kansas have a "T" value (tolerable soil loss) of 4-5 tons per acre per year, about the thickness of a dime. To limit water erosion, 30% ground cover or greater may be needed to reduce water erosion to "T" or less, especially in fields without erosion-control structures such as terraces. While flat stubble is very effective in limiting water erosion, standing stubble is essential for preventing wind erosion. K-State researchers found that wind erosion was effectively prevented when soil was at least 50% covered by crop residue. Even when baling corn stalks, it's better to leave some standing residue, which helps capture snow and reduce wind erosion (Figure 4).

**Figure 4. Field where stalks were baled, but some standing residue was left on the field. Photo by John Holman, K-State Research and Extension.**

**Nutrient cycling**

Crop residue is often regarded as a valuable source of nutrients. Significant amounts of nutrients, such as nitrogen, phosphorus, potassium, and sulfur, are left in corn residue following harvest (Figure 5), which can be recycled back to the soil through residue decomposition. Higher fertilizer costs often deem crop residue nutrients more valuable as decomposition occurs than previously recognized.

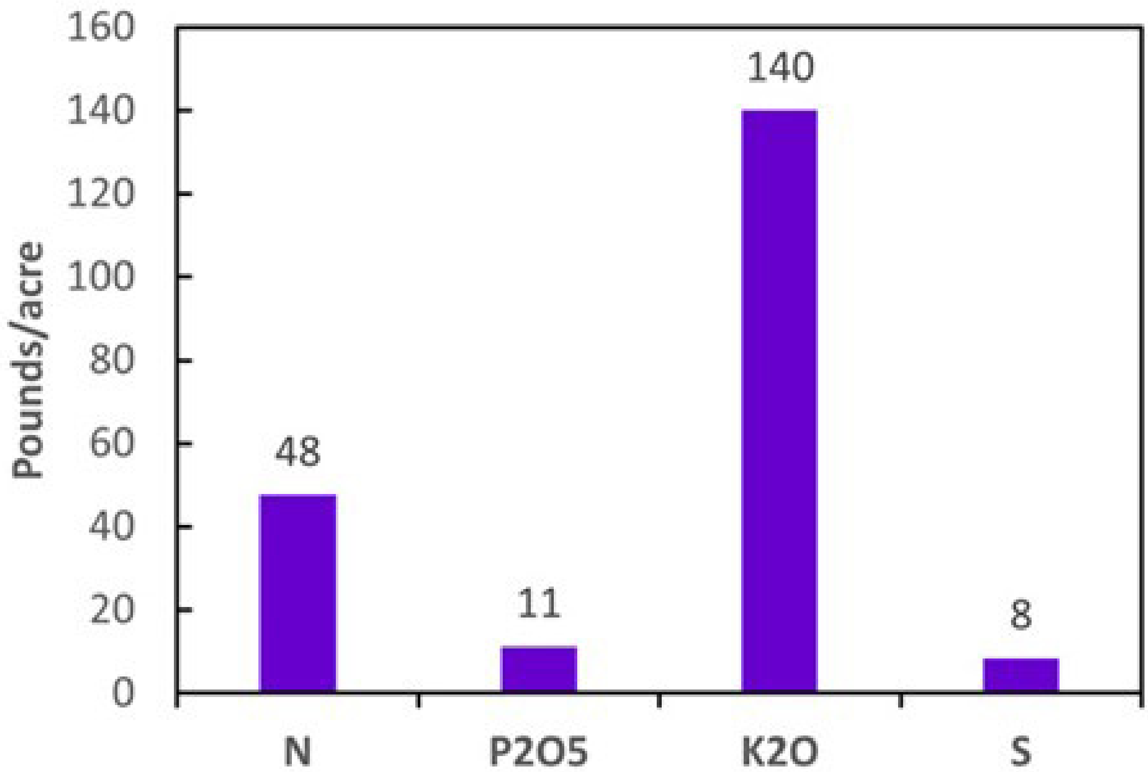



**Figure 5. Amounts of nitrogen (N), phosphorus ($P_2O_5$), potassium ($K_2O$), and sulfur (S) remaining in the residue following the harvest of a 200 bushel/acre corn crop.**

**Final considerations**

While baling corn residues can provide additional income, it may hurt soil and crop health, as well as long-term sustainability.

- Maintaining crop residues on the soil surface enhances soil water storage by increasing water infiltration and reducing evaporation.
- Crop residue protects the soil from the full impact of water droplets that can cause soil particles to detach and move with runoff.
- Crop residue reduces wind speed at the soil surface, which can also cause detachment of soil particles.
- Significant amounts of nutrients can be recycled into the soil with the decomposition of corn residue following harvest.

For more information on considerations before harvesting crop residue, see the publications:

*Crop Residues: Abundance and Considerations for Alternative Uses* from the K-State Research and Extension Bookstore

*Soil and Crop Response to Stover Removal from Rainfed and Irrigated Corn* from Global Change Biology Bioenergy

Wind Erosion Potential from Stover Harvest in the Central Plains: Measurements and Simulations from Soil & Tillage Research.

Logan Simon, Southwest Area Agronomist
lsimon@ksu.edu

DeAnn Presley, Soil Management Specialist
deann@ksu.edu

Tina Sullivan, Northeast Area Agronomist
tsullivan@ksu.edu

John Holman, Cropping Systems Agronomist
jholman@ksu.edu

## 6. Crop residues: Nutritive value and options for grazing

The five-year average of corn acres harvested reported by NASS yields an estimate of approximately 5.5 million acres of corn and over 10 million tons of residue produced annually in Kansas. In addition, 2.8 million acres of grain sorghum and 70,000 tons of residue were produced. While not all acres are suitable for grazing, this represents a tremendous resource for the state. Residue yield and nutrient contents are dependent on grain yield, fertility, harvest date, and conditions at harvest. The nutrient content of residues is additionally impacted by the duration and timing of grazing initiation.

**Figure 1. Cattle grazing crop residue. Photo by Sandy Johnson, K-State Research and Extension.**

The amount of grain left in the field has been significantly reduced compared to historical levels through improvements in varietal and harvest equipment. However, weather conditions can result in significant ear drop or plant lodging. Before grazing, scout fields to look for piles of grain on the ground. If grain piles are found, steps should be taken to remove these piles before turning out cattle on the field. If there are a lot of downed heads or ears and over 8-10 bushels of estimated grain on the ground, caution should be taken before grazing to avoid acidosis. Directions to estimate grain on the field from ear and head drop can be found here. While sorghum grain is always processed prior to feeding to crack its tough shell coat, cattle can still founder on downed grain sorghum heads.

**Nutritive value of corn and sorghum residues**

A nutritional evaluation of grazed Kansas corn and sorghum crop residues was conducted with the help of numerous producers and county agents across the state. Table 1 summarizes values from that survey.

**Table 1. Range of crude protein (CP), acid detergent fiber (ADF; higher values reflect lower digestibility), neutral detergent fiber (NDF; higher values reflect lower animal intake), and total digestible nutrients (TDN) in corn and sorghum residue from Kansas samples.**

| | Leaves | | | | Stem | | | |
|---|---|---|---|---|---|---|---|---|
| | CP | ADF | NDF | TDN | CP | ADF | NDF | TDN |
| Corn (Nov.) | 4.6 - 6.0 | 46.7 - 48.2 | 75.6 - 81 | 51 - 52 | 3.3 - 4.4 | 55.9 - 60.6 | 79.0 - 79.7 | 41 - 45 |
| Corn (Dec.) | 4.9 - 5.7 | 48.4 - 53.5 | 75.2 - 77.3 | 47 - 51 | 3.9 - 4.6 | 55.3 - 59.1 | 78.7 - 80.3 | 42 - 45 |
| | | | | | | | | |
| Sorghum | 8.3 - 11.7 | 40.3 -46.1 | 58.5 -65.7 | 53 - 57 | 5.3 - 4.9 | 46.3 - 50.4 | 66.2 - 73.5 | 49 - 52 |

A more detailed look at plant components indicates that any grain available would have the highest CP content, followed by the leaves. The cob has the lowest protein and energy value. The stalks and husks have similar crude protein content, but more energy is available from the husks than the stalks due to the lower lignin content. In general, leaves from sorghum residue have higher CP content than corn leaves. The stalks of corn and sorghum are similar in CP, but digestibility is somewhat higher in sorghum than in corn. More details on nutrient concentrations of crop residues can be viewed in this UNL publication.

**Duration of grazing**

To ensure adequate residue remains on the field after grazing, we can use animal weight and grain yield to determine the amount of grazing available. Cattle will readily remove approximately 15% of the residue (leaves and husk), but can be forced to remove more if desired. The goal should be to leave at least half of the total amount of residue on the field.

If an irrigated corn yield is 180 bu/acre, a rule of thumb is to divide by 3.5 to get grazing days for a 1200-pound cow. In this case, 180 bu/acre corn residue should provide approximately 51 days of grazing (180/3.5 = 51) for a 1200 lb cow. The harvest index (grain production/total biomass) is similar for corn and grain sorghum (1.6%). So, an 85 bu/acre dryland sorghum divided by 3.5 would provide approximately 24 days of grazing (85/3.5 = 24). A lactating cow or a heavier cow will consume more dry matter, and the grazing days need to be adjusted downward. A spreadsheet is available to calculate the stocking rate based on animal body weight and grain yield.

**Selective grazing**

Cattle will selectively graze the crop residue, eating the highest quality portions first, grain, then leaves and husks. Depending on the stocking rate, amount of grain available, and nutrient demands of the cows, no energy or protein supplementation may be needed early in the grazing period for dry cows with a body condition score of 5 or more and grazing as described above. Weathering and trampling will decrease quality over time, and this loss is greater with moisture and high humidity.

**Soil compaction considerations**

Cattle will cause soil compaction in paths leading to and around a water source. These compacted areas will only be surface compaction in the top two inches of soil. These compacted areas can be remedied by shallow tillage below the compaction layer.

Results on soil compaction from grazing have shown mixed results. A study near Bushland, TX, found that surface compaction in a no-till system reduced crop yield after several years of grazing. While grazing studies from Nebraska found no increase in compaction, and an increase in crop yield. Studies from western Kansas found compaction to only occur in the top two inches when grazing occurred on wet soils, and shallow tillage removed any compaction.

Compaction will be less on frozen, dry, sandy soils. It is best to remove cattle from the field to a nearby perennial pasture if the field is wet and not frozen. Also, the producer should be open to using shallow tillage if compaction occurs.

**Nutrient removal from grazing**

Another common concern regarding grazing residue is the removal of nutrients. Nutrient removal will vary by the type of animal, with a growing calf requiring more nitrogen than a mature dry cow. Dry cows will typically be used to graze residue, which will remove between 1 and 2 lbs of N per acre (depending on crop yield) and a few other nutrients. Crop residue is low in phosphorus (P); thus, producers will likely supply a free-choice mineral, resulting in an increase in the amount of P and calcium left in the field. Wind will blow leaves and husks off fields, but manure remains in place. Therefore, with proper grazing management, grazing can benefit livestock, soils, and economic profit.

John Holman, Cropping Systems Agronomist – Southwest Research and Extension Center
jholman@ksu.edu

Sandy Johnson, Extension Beef Specialist – Northwest Research and Extension Center
sandyj@ksu.edu