

According to the USDA Farm Service Agency, there are more than 14.7 million acres of native prairie in Kansas. At least 619,000 acres of these prairies are harvested for hay. Native meadows can provide relatively inexpensive forage and valuable feed sources for livestock production; however, some farmers have been facing reduced yearly forage production. Native meadows require management practices to ensure long-term forage accumulation and nutritive value.

Time of Cutting

The most important management factor in hay meadows is the harvest date. This date affects forage nutritive value, accumulation, botanical composition, and regrowth. Maximum forage nutritive value and yield cannot be achieved at the same time (Figure 1). Hay nutritive value peaks early in the growing season, when the canopy has a higher leaf proportion. Nutritive value progressively declines during summer as stem and dead material accumulate. The highest forage accumulation occurs late in the growing season, but three quarters of hay has been produced by mid-July. Cutting in early July in southern Kansas or mid-July in northern Kansas allows farmers to harvest the greatest yield with decent nutritive value.

High nutritive value is as important as high yield. Crude protein and available energy levels decline as forage plants mature. After early July, prairie hay nutritive value decreases rapidly. Crude protein declines more than 0.7 percentage units every two weeks during the month of July and will be no higher than 5% by late August.

Delaying harvest to obtain a higher yield is not an option because it affects more than the nutritive value. Harvesting in August or September does not give the warm-season perennial grasses sufficient time to replenish carbohydrate root reserves before the first frost. Low root reserves diminish the following year's yield and create vulnerability by weakening the plants. Repeated late-season

harvesting negatively influences perennial grasses' vigor, offering room for undesirable weeds and annual grasses to take over. The total forage accumulation of desirable species declines over time. If a native prairie cannot be harvested by August, it is best not to hay at all and graze after frost.

Cutting Height

After a harvest, grasses rely on the leaves left behind to capture sunlight and produce the carbohydrates that may be used to build a new canopy or add to the already stored carbohydrate reserves. The shorter the cutting height, the higher the dependency on root carbohydrates to ensure regrowth. For that reason, cutting height is an important management factor. In native prairies, the mower should be set for a 3- to 4-inch stubble height. The residue and litter left on the ground in the fall also protect against erosion and contribute to conserving soil moisture, improving next year's forage accumulation. In drought years, raise the cutting height to taller than 4 inches.

Grazing

After harvesting, perennial grasses need the remaining growing season to replenish root reserves; however, after frost, the native prairie can be grazed without negatively affecting next year's forage accumulation. Heavy grazing during winter may increase runoff and reduce soil moisture, but if managed to be

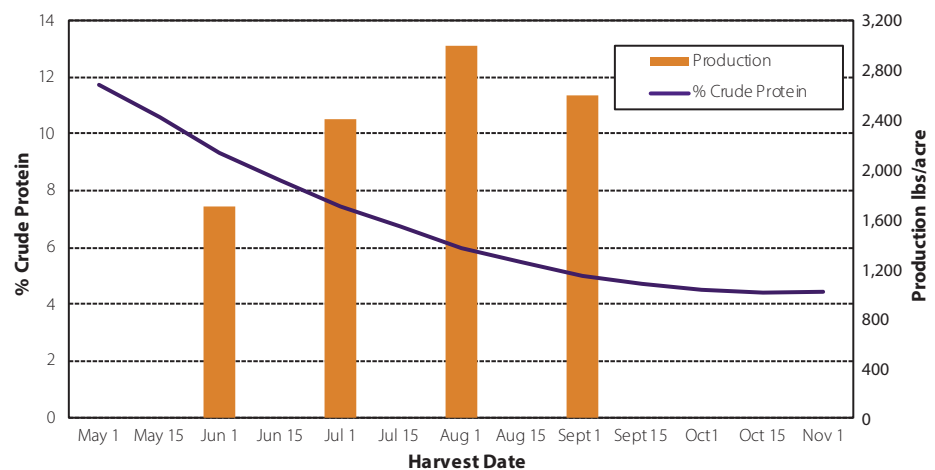


Figure 1. Time of harvest determines the yield and quality of prairie hay. (Baker et al. 1999.)

as uniform as possible, leaving 3 to 4 inches stubble height, the meadow can be burned in the spring.

Prescribed Burning

Prescribed burning improves both forage nutritive value and forage accumulation. Burning removes the old growth (dead material) that reduces hay's nutritive value. The best time to burn native hay meadows is mid-April, or when big bluestem and Indiangrass are 1 to 2 inches tall. Burning the hay meadow every 2 or 3 years increases desirable warm-season grass production. If the hay meadow is fertilized, annual burning is usually required to prevent shifts in botanical composition to cool-season grasses and annual forbs. Prescribed burning in late spring is an important tool for controlling weeds, brush, and undesirable cool-season grasses.

Fertilization

Nitrogen fertilizer, along with adequate rainfall, increases hay growth, but its effect on native warm-season grass production is limited. If annual grasses or forbs are present in the hay meadow, nitrogen fertilization increases forage accumulation. Do not apply more than 30 to 40 pounds of nitrogen per acre. The nitrogen fertilization after spring burn may contribute to increasing forage accumulation and nutritive value (Figure 2).

Native hay meadow soils frequently are deficient in phosphorus (low soil phosphorus test), and in some areas of the state, applying 10 pounds of phosphorus per acre can increase hay production. Phosphorus

fertilization often benefits broad-leaf forbs more than it does native warm-season grasses.

Nutrient removal in a native prairie can be equivalent to 5.4 pounds of P_2O_5 and 30 pounds of K_2O per ton of harvested forage. By taking soil samples every 3 to 4 years and monitoring yield, farmers can make fertilization-related decisions to maintain the meadow, ensuring long-term hay production.

If a hay meadow is fertilized, nitrogen and phosphorus should be applied when warm-season grasses are growing and have reached 3 to 5 inches. Earlier fertilization favors annual forbs and undesirable cool-season grasses such as Kentucky bluegrass and annual bromes. If plant composition begins to shift, burn fertilized hay meadows annually.

Weed and Brush Control

Many perennial forbs improve hay nutritive value and do not compete with grasses for moisture or nutrients. Harvesting at the right time, by early- and mid-July controls most undesirable annual weeds. However, pay attention to where bales have been left in the meadow, if the desirable plants under the bale are killed, it provides the perfect condition for annual weeds.

Prescribed burning controls most weed and brush species. Herbicides may kill both desirable and undesirable shrubs and forbs. Spot spray and wipe-on applications put herbicide where you need it and may be the best option to control weeds in a native prairie. Apply only herbicides labeled for target weed species and registered for use in hay meadows. Pay particular attention

to the weeds controlled and the waiting period between herbicide application and harvest. For the latest recommended chemicals, consult the Chemical Weed Control (bookstore.ksre.ksu.edu/pubs/CHEMWEEGUIDE.pdf)

Drought

Under drought conditions, harvest date and cutting height are critical to maintaining a productive meadow. Harvest should not occur later than mid-July, leaving at least 4-inch stubble height. If the forage is not tall enough by mid-July to justify harvesting, graze after the first killing frost.

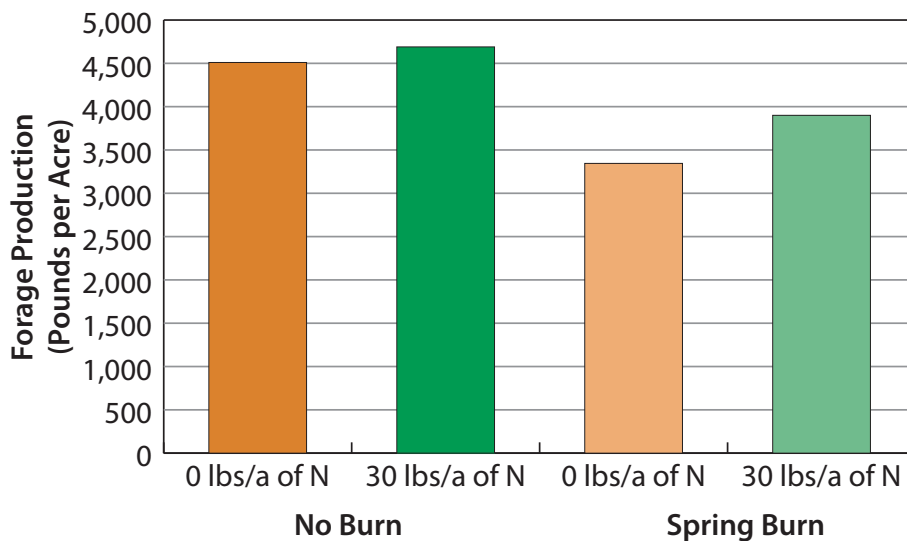


Figure 2. Forage accumulation after spring burn or not and fertilizing or not with 30 pounds per acre of nitrogen.

Summary

Harvest date is the most important managing practice in native hay meadows. Cutting by early July in southeast Kansas and by mid-July in northeast Kansas is best to ensure high yield and nutritive value. Cutting later in the growing season reduces nutritive value and shifts the plant population to undesirable weedy species.

Prescribed burning controls weeds, brush, and cool-season grasses, and increases the yield and nutritive value of desirable warm-season grasses.

Fertilizing with nitrogen and phosphorus increases hay yields, but usually favors forb and cool-season grass production unless applied in conjunction with annual prescribed burning.

Related Publications

- Rangeland and Pasture Grasses of Kansas (C567)
- Prescribed Burning as a Management Practice (L815)
- Prescribed Burning: Planning and Conducting (L664)
- Prescribed Burning Safety (L565)
- Rangeland Weed Management (MF1020)
- Rangeland Brush Management (MF1021)
- Chemical Weed Control for Field Crops, Pastures, Rangeland and Noncropland (Report of Progress issued annually)

Reference

Baker, J.C.; Tonn, S.R.; Paisley, S.I.; Kehler, David E.; and Blasi, Dale A. (1999) "Effect of date of harvest on the yield and nutritional quality of native grass hay," Kansas Agricultural Experiment Station Research Reports: Vol. 0: Iss. 1.

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