W1351

Maximizing Grazing Days with Seasonal Forage Planning

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Challenges and Opportunities in Tennessee's Forage Systems

Tennessee is located in the humid transition zone, where growing cool-season and warm-season pastures can be a challenge. Due to the weather conditions, some years may favor cool-season over warm-season forages, but tall fescue (*Schedonorus arundinaceus; Figure 1*) remains as the most used perennial forage grass across the state (Bates, 1999a). Tall fescue performs best in spring and fall, offering high yields and quality; however, the summer heat and drought slow its growth, creating a seasonal gap in forage availability.

Figure 1: Tall fescue pasture (Photo: Bruno Pedreira)

That's when warm-season grasses, such as Johnsongrass (*Sorghum halepense*), crabgrass (*Digitaria spp.*), and bermudagrass (*Cynodon dactylon*), often start occurring in pastures (Oakes & Hancock, 2020).

While some may see this as a problem, it can be an opportunity to diversify pastures and extend the grazing season. As forage availability changes throughout the year, forage management must adapt to seasonal shifts in pasture composition and condition (Mason, 2024). Choosing the right forage species for different operations or even parts of each farm, such as hillsides or water-logged areas, helps producers to improve efficiency and use of available land and resources.

That's especially important considering that Tennessee cattle producers feed hay for an average of 143 days each year, and in many cases, even during the summer (Griffith and others 2019). By adding other forage species to the system, farmers can:

- Reduce reliance on hay
- Meet livestock nutrition needs more consistently year-round
- Lower hay-related costs

A diverse forage system is more resilient, and able to withstand weather and management challenges. Introducing a variety of species, including annuals and warm-season forages, can improve the system's ability to cope with weather extremes like drought, early frost and flooding as well as pest and disease pressure.

To extend grazing days and reduce dependence on hay in Tennessee, producers can follow a practical, four-step approach: 1) **building a strong forage base with cool-season grasses and legumes** 2) **improve early-season forage availability by incorporating cool-season annuals** 3) **utilize warm-season forages to fill the summer forage gap** when cool-season species slow down and 4) **integrate cool- and warm-season forages** across the farm to create a more balanced, year-round grazing system.

1. Building a Strong Forage Base with Cool-Season Grasses and Legumes

- **Cool-season perennial grasses**

Cool-season forage grasses are the most used in Tennessee, with their peak biomass growth occurring in the spring followed by a smaller secondary peak in the fall (Figure 1). Perennial cool-season species such as tall fescue, orchardgrass (*Dactylis glomerata*), and timothy (*Phleum pratense*) are valued for their high crude protein (CP) concentration and digestibility, particularly when managed effectively (Bates, 1999a). However, these species are more sensitive to high temperatures and typically enter dormancy during Tennessee's hot summer months. This results in a forage gap lasting nearly three months which can be addressed by integrating warm-season forages into the system.

- **Cool-season legumes (especially clovers)**

Clovers are cool-season legumes that can be annual, as crimson clover (*Trifolium incarnatum*), biennial as red clover (T*rifolium pratense*), or perennial as white clover (*Trifolium repens*). These legumes contribute to soil fertility by fixing atmospheric nitrogen (N) through a symbiotic relationship with rhizobacteria. When clovers are interseeded into a tall fescue pasture, they can fix up to 60 pounds of N per acre annually, which increases forage accumulation, crude protein concentration and overall forage quality while helping to mitigate the effects of fescue toxicosis (Bates, 2009). For best results when planting cool-season forages, including clovers, be sure to follow the seeding rates, planting depth, and timing guidelines provided in the Forage and Field Crop Seeding Guide for Tennessee.

2. Boosting Early-Season Forage with Cool-Season Annuals

Cool-season annual forages, such as cereal rye (*Secale cereale*), wheat (*Triticum aestivum*), oat (*Avena sativa*) and annual ryegrass (*Lolium multiflorum*), are typically planted in the fall. These species grow through the winter and spring seasons, completing their life cycle by late spring or early summer. When managed properly, they provide valuable forage during the cool-season months and help bridge seasonal gaps in perennial forage production.

Cool-season annual forages can give a big boost to spring pasture growth. Farmers can graze them early in the season or cut them for silage, haylage or hay to increase forage supply. If harvested at the boot stage (just before the head emerges), these forages can have crude protein levels as high as 20 percent. Some species may even regrow if the growing point (apical meristem) is not damaged by grazing too short or cutting the hay too close to the ground (Phillips and others, 2021). For example, tall fescue should not be grazed lower than 3 – 4 inches to ensure proper regrowth and long-term stand performance.

Overseeding cool-season annuals into warm-season pastures allows farmers to make better use of seasonal growing conditions. This system:

- **Extends the grazing season** into late winter and early spring.
- **Reduces reliance on hay** by providing early forage before tall fescue growth resumes.
- **These forages are ready to graze one after another in a set pattern:**
    - **Cereal rye:** Often ready by late January or February.
    - **Wheat and oats:** Provide forage through March and April.
    - **Annual ryegrass:** Becomes abundant mid- to late spring, maintaining forage availability into May.

3. Utilizing Warm-Season Forages: Filling the Summer Forage Gap

Warm-season forages, whether annual or perennial, grow during the summer months (Figure 2). They usually produce higher yields than cool-season plants but often with lower crude protein and digestibility. However, when managed properly and harvested at the boot stage, their nutritional quality can be comparable to that of cool-season forages. Several warm-season species grow well in Tennessee and are often seen as weeds in tall fescue-based systems. These include Johnsongrass, bermudagrass, dallisgrass (*Paspalum dilatatum*), sorghum (*Sorghum bicolor*) and crabgrass. For example, crabgrass has naturally filled in thin fescue pastures that struggle during hot, dry summers. To take full advantage of their benefits, plan to plant warm-season forages in May or June, when weather conditions and soil temperatures are optimal for establishment and growth (refer to the Forage and Field Crop Seeding Guide for Tennessee).

Some warm-season forages can accumulate dangerous levels of nitrates, especially under stressful conditions like drought, frosting event or heavy nitrogen fertilization. These elevated nitrate levels pose a serious risk to livestock and should be monitored closely.

- **At-risk forages** include Johnsongrass, sorghum, bermudagrass and corn.
- **Toxicity trigger conditions:** drought, excessive nitrogen use, frosting and sudden weather changes.

- **Nitrate levels do not decrease** during haymaking, so preserved forage remains risky.
- **Symptoms of nitrate poisoning** in cattle may include:
  - Staggered gait
  - Muscle tremors
  - Dark or bluish mucous membranes
  - Sudden death (often before symptoms are noticed)
- **Recommendation:** Always test forage for nitrate levels before grazing or harvesting under stress conditions. More information can be found on Nitrate toxicity in forages.

4. Integrating Cool- and Warm-Season Forages for Year-Round Grazing

- **Strategic Use of Warm-Season Forages**

Although most forage-based systems in Tennessee rely almost exclusively on tall fescue (a perennial cool-season forage), strategically combining cool- and warm-season species on the farm can be impactful for managing the annual forage budget. While tall fescue may provide grazing for eight to nine months of the year, the summer forage gap has become increasingly challenging, and feeding hay from November through March has become routine.

A practical strategy is to set aside a portion of your land, up to 25 percent, for warm-season forages. This helps ensure steady grazing during the hotter months when cool-season grasses slow down, effectively filling the summer "forage gap." Warm-season forages can also be harvested as hay, haylage or silage and stored for winter feeding. These same warm-season pastures can then be interseeded with cool-season annuals in the fall to offer earlier grazing opportunities in late winter or early spring. This early-season forage from cool-season annuals not only fills the gap during a low-production period but also helps delay grazing on perennial cool-season pastures, allowing those pastures additional time to recover and accumulate more forage. This seasonal dynamic throughout the year is illustrated in Figure 2.

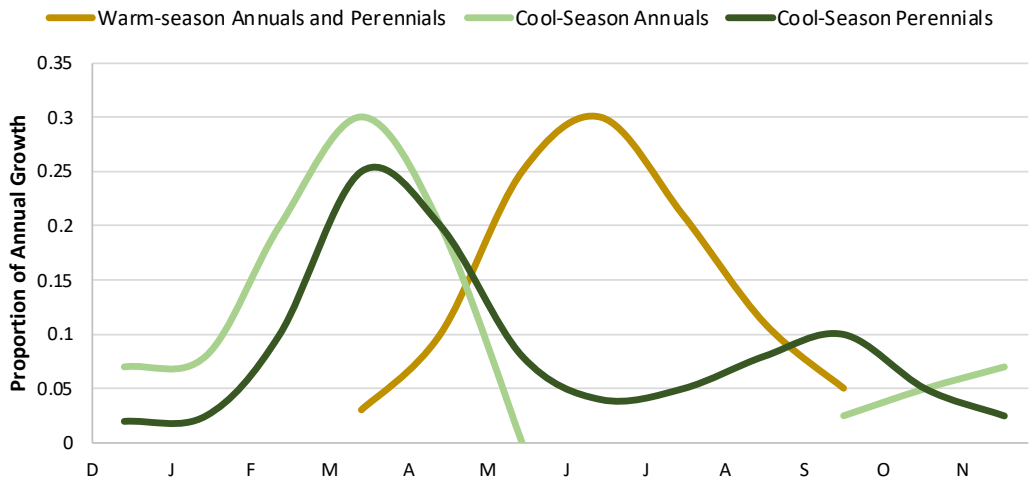

Figure 2: *Schematic representation of the growth curve for different forage species throughout the year.*

- **Managing Annuals to Reseed**

If you're using warm-season annuals, such as crabgrass, consider letting them go to seed in late summer/fall. This allows the seeds to remain in the seedbank and helps to ensure a natural regrowth the following summer. While crabgrass reseeds well, sorghum and pearl millet will not.

When incorporating cool-season annuals, be cautious not to overseed them into cool-season perennial pastures. Since both cool-season annuals and perennials grow during the same time of year, they will compete with each other rather than complementing one another. Instead, plant cool-season annuals into warm-season perennial stands for better synergy.

- **Extending the Grazing Season with Stockpiling**

Additionally, if you want to make the most of your perennial cool-season pastures, consider using stockpiling techniques. Stockpiling is another effective technique for extending the grazing season (Figure 2), and it works particularly well with tall fescue due to its strong fall growth potential and ability to maintain high nutritive value after stockpiling. This forage preservation method, often referred to as standing hay, involves:

- **Mow or graze pastures in late summer**, then let them rest and regrow.
- **Apply 40-60 pounds of nitrogen/acre** to boost fall growth.

- **Start grazing in early winter** when other forages slow down their growth.
- **Benefits:**
  - Up to **2,000 pounds/acre** of forage
  - **Proper quality:** ~14 percent crude protein, 60 percent digestibility

These nutrient levels are sufficient to reduce hay needs and lower winter-feeding costs (Fancher, 2023). A small change that makes a big difference in winter feeding.

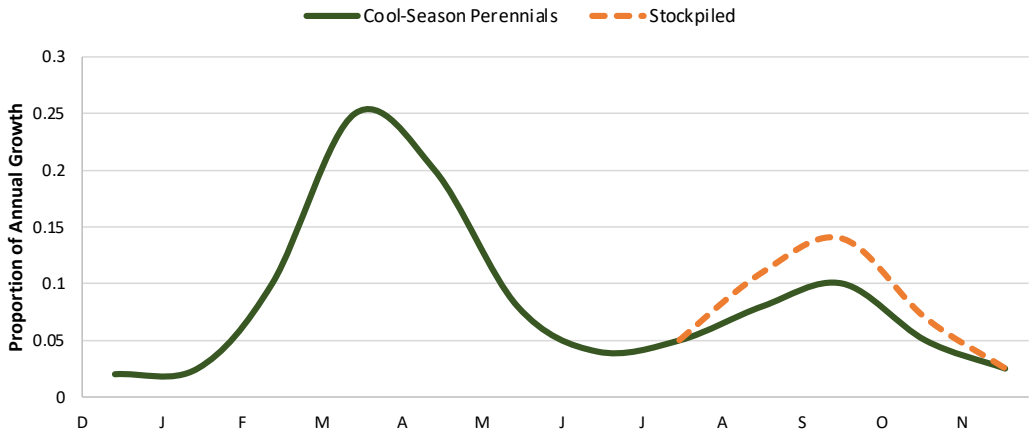

Figure 3: *Growth curve of cool-season perennial forages, highlighting the effect of stockpiling on extending forage availability into winter.*

Take-home Message

There are numerous opportunities to use cool- and warm-season forages to extend the grazing season in Tennessee. Intensifying a cattle operation does not require an overly complex system, it starts with making practical improvements where possible. Taking a step-by-step approach, such as introducing one additional forage resource that best fits the farm's conditions, is a great starting point. This simple adjustment can reduce reliance on hay and supplemental feed throughout the year, with the added benefit of seeing those results reflected in real savings.

Online Resources

UT Extension Publication PB378. Forage and Field Crop Seeding Guide for Tennessee: tiny.utk.edu/SG

UT Extension Publication W1314. Nitrate Toxicity in Forages: tiny.utk.edu/PfoVE

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