

# Perennial Grasses: Opportunities in Dairy Cattle Diets

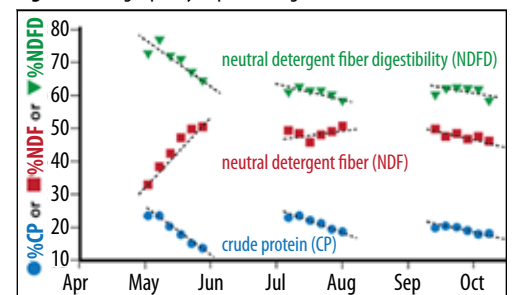
Matt Akins, University of Wisconsin-Madison

Dairy cattle groups (i.e., milk cows, dry cows, heifers) have very different nutrient needs, which allow for feeding of various types and qualities of forages to meet each group's needs. Corn silage is often managed to maximize forage yield and energy for use in lactating-cow rations. However, its high energy and low fiber content limits its use in dry cow and heifer rations. Alfalfa is a mainstay on dairy farms due to its ability to fix nitrogen (N), resulting in a high-protein content, along with having good yields and overall quality (low fiber and high non-fiber carbohydrate content). Fiber digestibility of alfalfa is often less (albeit not all alfalfa varieties) than grasses, which can restrict its inclusion in lactating-cow rations benefiting from highly digestible fiber forages. Perennial cool-season grasses have desirable quality characteristics for lactating cows, dry cows, and for heifers depending on forage maturity and species.

**Harvest Timing.** Cool-season perennial grasses can be highly variable in quality due mostly to harvest maturity. This is especially the case during first harvest or early season grazing as plants become reproductive with stem elongation and heading. After most cool-season species complete their reproductive phase and return to vegetative growth after harvest, close grazing or clipping, the forage quality declines more slowly over time. Timothy and smooth brome grass are unique as they can produce reproductive stems during later harvests. Geoff Brink found the quality of perennial cool-season grass during first harvest was of higher quality but declined quickly as the plant matured reproductively compared to subsequent harvests that were vegetative growth (Figure 1). This illustrates the importance of timing the first cutting of perennial grasses in the spring at the correct maturity stage for the desired quality with stem elongation to early boot stage ideal for lactating cows or young heifers, and heading stage best for dry cows or pregnant heifers. Timing of subsequent harvests is less critical to get desirable quality, with harvest usually based on the forage height/yield or the number of desired harvests with 35-day intervals allowing for 4-5 harvests. Shorter intervals between cuttings may not improve quality but will decrease yield, while longer intervals may not improve yield due to fewer harvests and growth rate slowing as forage accumulates. The flexibility in the second and later harvests allow farmers to delay harvest without having significant declines in quality.

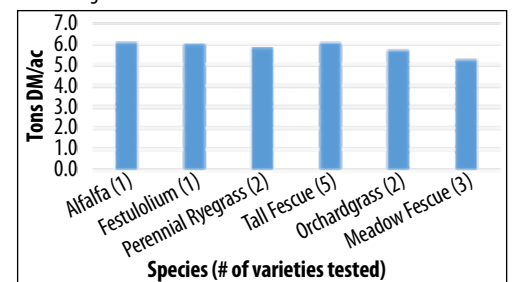
**Forage Quality Potential.** Work by Jason Cavadini (UW-Madison Extension Grazing Specialist) conducted at the Marshfield Agricultural Research Station has shown various perennial cool-season grass species can have high quality along with good yields (5-6 tons DM/ac using a 4- or 5-cut system; Figure 2). First harvest was taken early June with subsequent harvest intervals of 35-37 days for second, third, and fourth harvests, and 26 days for fifth harvest. Crude protein (CP) content of first harvest was slightly lower (11-13% CP) compared to subsequent harvests (13-15% CP for second and third cuts, and 18-25% for fourth and fifth cuts). Neutral detergent fiber digestibility (NDFD) was only a few points lower for first harvest (64-68% NDFD-30) due to harvesting at elongation to boot stage; compared to second to fourth harvests being 66-74% NDFD-30. The fifth harvest taken in mid-October had very high quality (70-77% NDFD-30), but low to moderate yields (0.2-0.7 tons DM/ac) which may not cover harvest costs. To help save harvest costs, farmers could delay the fourth cutting a week or two to capture additional yield with little impact on quality. To help maintain yield and quality, plots were fertilized with 40 lbs N/ac each cutting rather than using one or two applications. With current high fertilizer prices, a main advantage of grasses is the use of in-season liquid manure applications to split apply N after each harvest. Work from Vermont (Carter and others, 2010) has shown the use of band application instead of surface broadcast of manure reduces N losses and improves

Figure 1. Forage quality of perennial grasses across three harvests.



Source: Geoff Brink, USDFRC, 2015.

Figure 2. Third-year yield of cool-season perennial grasses across five cuttings in 2021.



Source: Jason Cavadini.

grass forage growth by 6-14%. Application of manure soon after harvest is also important to minimize traffic on developing tillers and microbial contamination of the subsequent harvest.

**Use in Dairy Cattle Rations.** Perennial grasses have potential use in any dairy cattle diet depending on forage quality (e.g., protein, fiber, digestibility, minerals). Use of grass forage in lactating-cow rations is limited by the fiber content due to rumen fill, but if fiber digestibility is high, then fiber will have less effect on intake. Grass forages can be very useful in late-lactation cow diets which can include higher fiber levels and greater portion of grass forage. Inclusion depends on the current forage composition with most situations using grass forage to partially replace alfalfa forage to improve diet fiber digestibility, or completely replace chopped straw. Dry-cow rations also are an option to include grass forage in place of wheat straw that is often used to increase fiber content and help reduce occurrence of displaced abomasum. Grass forage has greater protein content which minimizes supplement needs. A concern with using grass forage in dry-cow rations (mainly pre-fresh) is the potassium content can be high, which affects diet mineral balance. So be sure to do a wet chemistry mineral test before feeding. Heifer rations can include a significant portion of grass forage, with young heifer rations needing similar quality to lactating cows, while breeding and pregnant heifers can be fed high-fiber rations with more mature grass forage. Overall, grass forage can be a useful source of highly digestible fiber important to rumen health of lactating cows while also having potential to feed other dairy cattle groups.

**References:**

Brink, G. 2015. Growing high-quality grasses for dairy rations requires attention to detail. US Dairy Forage Research Center factsheet.

Carter, J.E., W. Jokela, S. Bosworth. 2010. Grass Forage Response to Broadcast or Surface-Banded Liquid Dairy Manure and Nitrogen Fertilizer. *Agronomy Journal*.