

Comparison of Perennial Ryegrass and Tall Fescue in a Pasture-based Dairy Grazing System

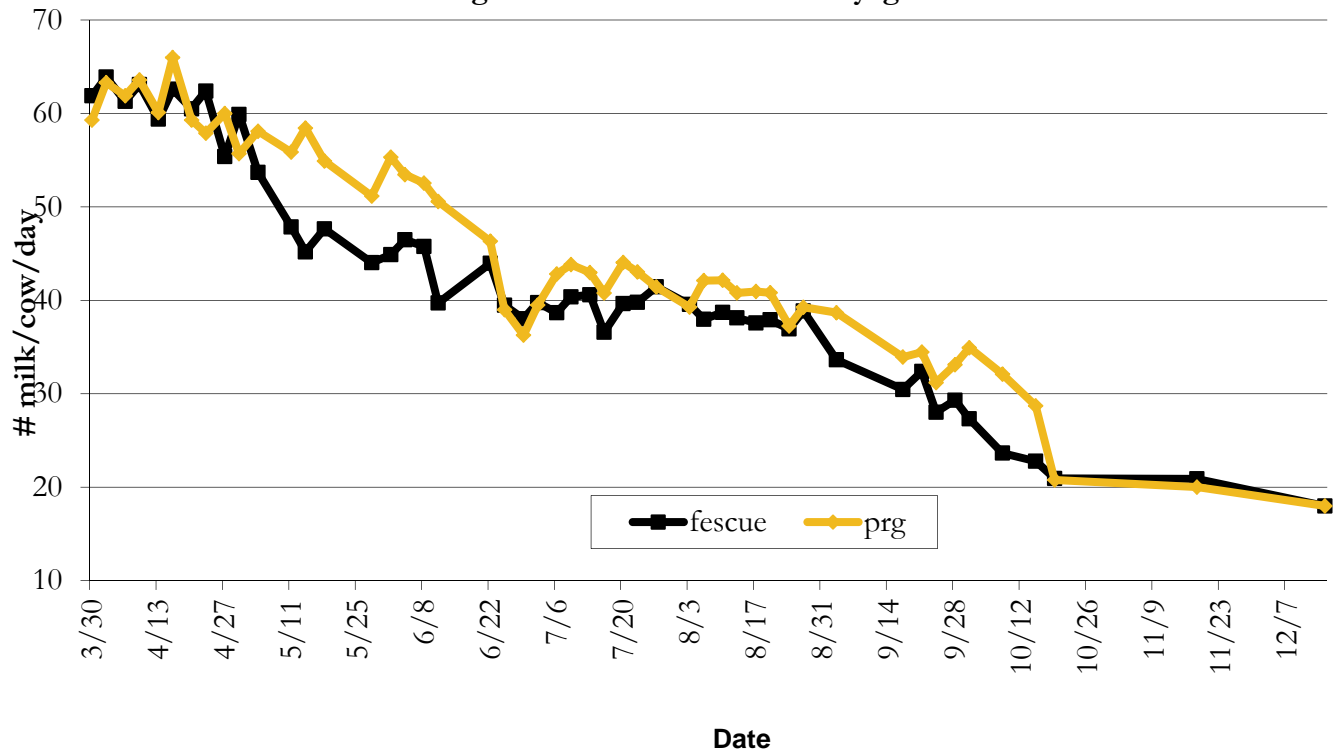
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April 2013

The use of pasture as a component of dairy cattle diets is prevalent across many areas of the world. However, in the United States grazing is a relatively new management strategy in most parts of the country. Due to the continental climate in many parts of the Midwestern US and vast differences in weather and soil types, many different forages have been utilized to allow for maximum days of grazing. Two of the more popular forage species for dairy grazing systems are tall fescue and perennial ryegrass. Both of these species are used as the base or predominant species for many grazing systems. Other species such as cool and warm season annuals may be used as complimentary forages to reduce the pasture feed deficit that may occur in summer, early winter and early spring when tall fescue or perennial ryegrass may be semi-dormant. Base forages in grazing systems must exhibit stand persistence, yield and nutritive value to ensure appropriate nutrient intake for the majority of the grazing season. When base forages do not meet or exceed feed demand or quality needs of livestock, supplemental feedstuffs must be provided at added costs. While maximizing forage yield is critical, balance between yield and nutritive value must be met.

In this demonstration at the University of Missouri's Southwest Research Center (Mt. Vernon, Missouri), 60 crossbred (Holstein-Jersey) cows were randomized on age, previous milk production, calving date and body weight. Thirty cows were assigned to graze 24 acres of either tall fescue (BarOptima E24: Barenbrug Seed) or 24 acres of perennial ryegrass (BG-24T: Barenbrug Seed). Cows were added to each system as the forage growth would allow until a maximum of 30 cows

were assigned to a 24 acre system. All paddocks were approximately 200 feet by 435 feet (2 acres). Cows were allocated an area in each paddock that would provide 15 pounds of available dry matter per cow for each grazing episode (450-500 pounds dry matter) between milking times (6 am and 4 pm). Pastures were measured weekly using a rising platometer to determine the sequence of grazing. Cows were placed on a paddock with an objective of 2,200-2,800 pounds of total dry matter per acre. The goal was for cows to graze down to a hard deck residual of 1,450 pounds of dry matter per acre (approximate range 1,200-1,800). Cows were supplemented with grain throughout the grazing season based on pasture availability (6-12 pounds per cow per day). Warm season annuals were provided during the summer period when the treatments would not provide adequate dry matter intake. Additional supplements were provided (alfalfa hay/balage) when pasture would not provide adequate intake. Milk production per cow was measured 3 times weekly in year one and daily in year 2.

**Graph 1: Milk Production per Cow,
Grazing Tall Fescue or Perennial Ryegrass**



In general, cows grazing in the perennial ryegrass system produced more milk per cow. This was most evident in May and June where the reduction in milk production may be due to the fact that tall fescue has a greater decline in forage nutritive value than perennial ryegrass when the reproductive phase is achieved. Perhaps there is a greater reduction in intake of tall fescue compared to perennial ryegrass when concentrations of fiber increase in both forages. Additionally, the NDFD of PRG has been shown to be more greater than that of tall fescue.

Milk production per cow only explains part of each system. In graph 2, milk production is displayed as milk produced by day showing the impact of stocking rate. The fescue grazing system allowed cows to graze 1-2 weeks earlier than cows on the perennial ryegrass system. The fescue system reached maximum stocking rate (30 cows/24 acres) earlier than the perennial ryegrass.

Graph 2: Milk Production by Date

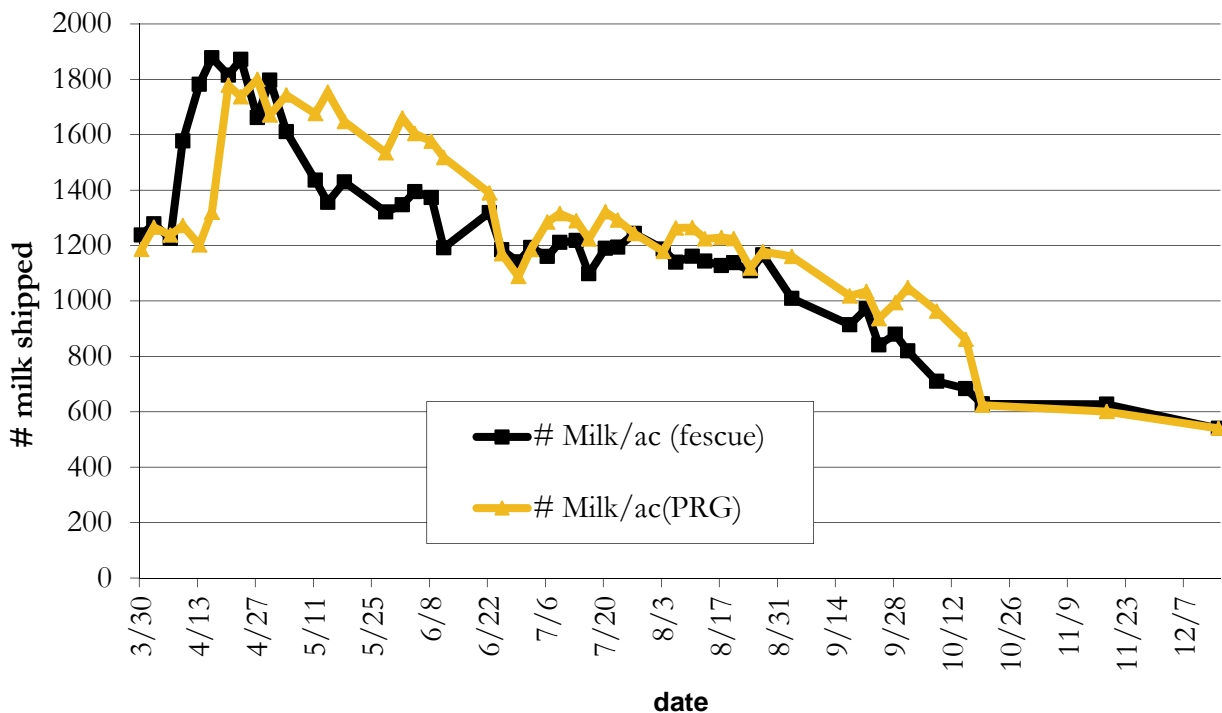


Table 1: Pounds of Dry Matter /Acre by Period

	Tall Fescue 2010	Perennial Ryegrass 2010	Tall Fescue 2009	Perennial Ryegrass 2009
Commencement to July 1	3,773	4,228	4,600	4,510
July 1-Sept 1	476	0	1,211	882
Sept 1-Dry Off	2,646	1,148	1,575	1,757
TOTAL DM/acre (pounds)	6,895	5,376	7,386	7,149

Dry matter yield (pounds of DM/acre) for 2009 and 2010 is shown in table 1 for perennial ryegrass and tall fescue. In 2009, a more atypical pattern developed, with cooler than normal temperatures throughout most of the year along with adequate moisture. In 2010, a weather pattern more typical of southern Missouri prevailed, with adequate moisture in the spring, hot and droughty conditions in the summer, and adequate moisture in the fall. These weather patterns are consistent with the dry matter yields in Table 1 for each forage species. Dry matter yields were similar in the spring of 2009 while in 2010 perennial ryegrass yielded nearly 500 pounds more dry matter per acre than tall fescue. This advantage was negated in the summer period where tall fescue yielded 350-476 pounds more dry matter per acre. The fall period was most dramatic in 2010 where tall fescue yielded nearly 1,400 pounds more dry matter per acre than perennial ryegrass. Tall fescue yielded 1,500 more pounds of dry matter per acre overall in year 2010. In year 2009, perennial ryegrass and tall fescue were similar in overall yields with tall fescue yielding 200 more pounds of dry matter per acre. The importance of periodic yield is equally as important as overall yield. Forages that may produce the majority of their yield in one period of the year compared to other forages will require more mechanical harvest and the need to feed this harvested feed back to the livestock as a later time. Tall fescue yields in this demonstration were more evenly distributed throughout the grazing season than perennial ryegrass and grazing management decisions were easier to make.

Total milk production per cow and per acre are shown in table 2. Cows grazing perennial ryegrass consistently yielded more milk per cow and per acre in both 2009 and 2010. This milk production is the actual milk produced from all feeds fed throughout the lactation.

However, in table 3 an estimated breakdown of forage supplied from tall fescue and perennial ryegrass is used to calculate estimated milk production per cow solely from these forages. In 2010, tall fescue yielded nearly 1,000 pounds more milk per cow and provided 41% and 38% of the feed and energy, respectively, when compared to the total annual inputs. Perennial ryegrass provided only 28% and 25%, respectively of feed and energy supplied. This occurred in a year that resembles a more typical southern Missouri weather pattern especially compared to 2009 with cooler temperatures and abundant moisture. In 2009, estimations of milk production were similar between tall fescue and perennial ryegrass. Cows grazing perennial ryegrass had a slight advantage or 300 pounds more milk per cow.

Table 2: Milk Production per Cow and per Acre for Tall Fescue and Perennial Ryegrass

	Tall Fescue 2010	Perennial Ryegrass 2010	Tall Fescue 2009	Perennial Ryegrass 2009
Milk/Cow	9,513	10,277	9,785	10,531
Milk/Acre	11,576	12,294	11,916	12,619

Table 3: Estimation of Feed and Energy Supplied from Tall Fescue and Perennial Ryegrass

	Tall Fescue 2010	Perennial Ryegrass 2010	Tall Fescue 2009	Perennial Ryegrass 2009
% Feed	41	28	48	47
% Energy	38	25	45	45
# Milk estimated from energy	3,580	2,607	4,429	4,753

Perennial ryegrass and tall fescue were similar in nutritive values (Table 4). This is in slight contrast to Hamilton et al., (in press) where perennial ryegrass tended to have higher nutritive values across different cutting heights. However, an estimation of milk production of cows grazing tall fescue and perennial ryegrass showed similar milk yields per cow. This similarity in milk yield was due to tall fescue consistently having more dry matter yield per acre than perennial ryegrass and outweighing the slight advantage of perennial ryegrass' nutritive value. In this study, a difference in stand longevity was also perceived where perennial ryegrass had optimum tiller counts at cutting heights of 5 inches or greater but a substantial reduction in milk yield due to reduced overall dry matter yield per acre. This is similar to what was found in this demonstration where perennial ryegrass required overseeding or under sowing after year 2 of grazing.

Table 4: Nutritive Value of Tall Fescue and Perennial Ryegrass

	Crude Protein	% Dry Matter	ADF	NDF	NEI (mcal)
Tall Fescue	19.5	21.6	26.6	47.4	0.69
Perennial Ryegrass	20.7	26.0	27.1	46.5	0.69

In summary, tall fescue appears to be a more consistent and reliable forage for climates similar to southern Missouri. In most years, periodic drought and extreme temperatures in summer will reduce stand persistence and dry matter yield of perennial ryegrass. From these studies it suggests the overall yield will impact milk production per cow more directly than the nutritive value if the forages are managed appropriately. Additionally it was felt the reliability of the tall fescue in the fall from a stand and yield perspective makes it a viable selection for dairy grazing systems.