Meadow Fescue: A Sleeping Giant Awakened by Intensive Rotational Grazing

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"To every thing, there is a season." For meadow fescue, that 'season' appears to have been ushered in with the practice of intensive rotational grazing in the driftless (unglaciated) region of southwestern Wisconsin and adjacent states. For decades, the existence of meadow fescue in Wisconsin was literally unknown, with a few plants surviving in non-farmed areas such as the oak savannas common to the region.

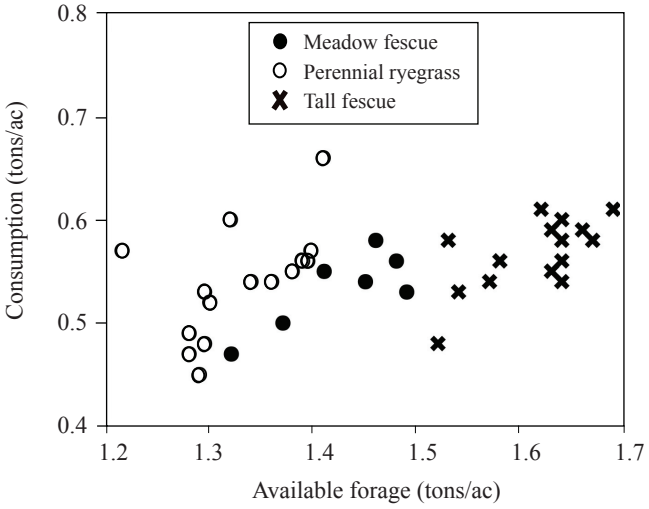
Then in the late 1980s, rotational grazing dairy systems began to catch on, especially in this part of the state where cropping is difficult due to the steep hillsides. Two important events occurred that caused the research of meadow fescue as an option for intensive rotational grazing pastures to get underway. One was a request by some graziers in the Southern Wisconsin Farmers Research Network to conduct some research on pasture grasses. Funding was graciously provided from the newly formed Center for Integrated Agricultural Systems at the Univ. of Wisconsin-Madison.

In 1990, the first on-farm grazing trial compared 91 different varieties of pasture grasses including meadow fescue. Since no one in the U.S. was producing meadow fescue seed at the time, seed had to be imported from Europe in order to conduct the research. The results of this study confirmed what early agronomists already had learned, and what caused farmers in the U.S. to replace meadow fescue with tall fescue beginning in the 1950s; all of the tall fescue varieties had more available forage than all of the meadow fescue varieties.

More Palatability

However, the superior palatability of meadow fescue resulted in equal consumption of tall and meadow fescue, despite the greater availability of tall fescue forage (Figure 1). Since meadow fescue looked so good in this trial, it was decided to do more breeding and evaluation research. Meadow fescue also exhibits other desirable grazing characteristics for cool-season regions including: ability to withstand grazing pressure, drought tolerance, and superior cold tolerance (providing long-term persistence under severe winter conditions, including open winters with low temperatures, dry winds, and little snow cover).

Figure 1. *From an on-farm grazing study comparing pasture grasses back in 1990, it was discovered that cows eat just as much meadow fescue as tall fescue even though tall fescue is more productive*



The second event also occurred in 1990, but it took longer to recognize its importance and its relation to meadow fescue research. Charles Opitz, a dairy grazier from Mineral Point, WI, discovered an unknown grass growing in a remnant of the ancient oak savanna ecosystem on his farm. This plant formed a dense ground cover in deep shade underneath a dense canopy of oak trees at the top of a hill. When researchers saw them the plants were in the vegetative stage (no seed heads to evaluate), and they immediately recognized the leaves as appearing like a ryegrass or fescue-ryegrass hybrid.

Fast forward 11 years to 2001 when Mr. Opitz asked researchers to come to the farm and take a ride around the farm. Researchers spent most of the morning riding from pasture to pasture and walking through acres and acres of this unknown grass. There were nearly 1,000 acres of this grass, most of it in beautiful, dense, and productive monocultures. Through his persistence, Mr. Opitz finally had the undivided attention of the researchers.

It turns out that Mr. Opitz – with help from his cows – had very ingeniously spread this unknown grass around the farm. As the grass gradually spread from the oak grove on top of the hill into other pastures, he realized that his cows were spreading it by eating ripe seeds and scattering seed in their manure. So he helped the process along by harvesting hay on some paddocks after seed had ripened, and then feeding these hay bales on pastures during the winter so that the cows would spread seed with their manure.

After gathering samples from the Opitz farm and using DNA testing to compare the unknown grass with fescue samples from around the world, the unknown grass was finally identified as meadow fescue. This was very surprising since, by the late 1950s, meadow fescue had disappeared from the public consciousness, from the USDA statistical reporting service, and from much of the agricultural landscape – replaced by the higher-yielding tall fescue and the conversion of pastureland to cropland.

Plants Survived 10+ Years

DNA markers were used to discover that the individual plants on the Opitz farm had survived for 10 years since their

original establishment as seedlings from manure following the winter feeding of mature hay: 1) no evidence was found that neighboring plants were more genetically related to each other than non-neighbors (which would be the case if plants were dropping seed and establishing new daughter plants); and 2) there were no meadow fescue seeds in 51 soil samples taken from the Opitz farm. This verified that the plants were very drought tolerant in the shallow soils of southwestern Wisconsin hill country and very cold tolerant during stressful winters.

Using plants collected on the Opitz farm, a seed production field at the UW Agricultural Research Station in Arlington was established. A breeder's seed of the new variety, Hidden Valley, was produced in 2007 (Mr. Opitz named the variety after the farm from which it was collected). Researchers are in the process of formalizing the release of this variety through the USDA Agricultural Research Service and moving the breeder's seed into the seed multiplication process. Researchers expect commercial seed of Hidden Valley Meadow Fescue to be available as early as 2011 or 2012.

In 2005-06, Geoff Brink of the U.S. Dairy Forage Research Center (DFRC) conducted a plot study comparing orchardgrass, tall fescue, and three varieties of meadow fescue (including Hidden Valley) in north central and southern Wisconsin. The statistical analysis is not yet complete, but preliminary results show that forage yields of Hidden Valley are very competitive with both orchardgrass and tall fescue. Brink continues to conduct more studies comparing meadow fescue with other pasture grasses under grazing conditions at the DFRC farm in Prairie du Sac.

Found on Other Farms, Too

As word spread of the work to identify the unknown grass on the Opitz farm, several neighboring farms with the same grass were discovered. Was this grass isolated to the Mineral Point, WI, area, or was it more widespread? Thanks to a grant from the Wisconsin Department of Agriculture's Grazinglands Conservation Initiative (GLCI) program, researchers were able to conduct a survey of the region. During the summer of 2007 researchers and crews traveled over 17,000 miles in Wisconsin, Illinois, Iowa, and Minnesota, covering as much of the driftless region as possible.

Sampling meadow fescue plants using the spoke-and-wheel design

As survey regions were added, certain boundaries became noticeable. Every positive sighting of meadow fescue was within the driftless region in the four neighboring states. This region was not glaciated and is characterized by hilly country with highly eroded and shallow soils, frequently exposed limestone bedrock, cold and clear streams, and many remnant oak savannas. Only a sliver of a once vast ecosystem that served as a transition between the tallgrass prairie to the west and the hardwood forests to the east remains. Researchers think this is where most meadow fescue survived the industrialization and mechanization of agriculture combined with significant urban development during the 20th century. This is where the giant 'slept' for many years.

An unknown grass, which turned out to be meadow fescue, was first discovered in this ancient oak savanna on the Charles Opitz farm in southwestern Wisconsin

Why Here and Now?

But why did the giant awaken here and now? The 'now' is fairly easy to explain and likely relates to the grazing movement of the past 20 years. Natural conversion of cropland to pasture, and an increasing awareness of managed grazing systems with highly controlled stocking rates and grazing frequencies, favors meadow fescue. Mr. Opitz firmly believes that the latter is partly responsible for the fact that his meadow fescue populations increased from a few acres to hundreds of acres of healthy, productive, and resilient pasture. It is reasonable to think that changes in grazing management may have favored meadow fescue on many other farms, too.

The 'here' question is more difficult to answer, and one can only speculate. Researchers know that meadow fescue comes from northern Europe and from high altitudes of the mountains in southern Europe. The driftless region in southwestern Wisconsin contains many environmental similarities – soil and climate – to native European habitats where native meadow fescue is found.

Researchers have identified one more factors that may be partly responsible for the long-term survival of meadow fescue in the driftless region. Only 75 plants have been tested so far, but every plant tested is a host to the meadow fescue endophyte. This fungus, living in the stems and leaves of meadow fescue, helps the plant to survive stresses such as heat and drought without producing compounds that are toxic to livestock or that negatively affect palatability. It is fairly clear that the endophyte is helping these plants to survive in this region. It presents an interesting challenge to learn why and how this occurs.