

An Example of an Outreach Program for Horse Pasture Management and Education

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Abstract

Kentucky boasts over 30,000 horse farms that house over 200,000 horses. The University of Kentucky Horse Pasture Evaluation Program began in 2005 to assist horse owners and managers in improving pasture quality and quantity. This program collects detailed botanical composition and tall fescue analysis to provide horse owners and managers with a comprehensive picture of pasture composition and field by field recommendations on management practices that will improve each pasture. Samples of tall fescue are also collected and analysed for endophyte presence and ergovaline concentration to evaluate tall fescue toxicity risk. Management recommendations include tall fescue mitigation or elimination strategies. All of this data as well as recommendations, maps, and publications are presented in a detailed report and discussed with the farm. The program has exceeded expectations, and to date, has conducted over 300 evaluations on 175 farms across 26 Kentucky counties. Because of the connections made by this program to the horse community, the University of Kentucky Forage Extension Program has expanded its work in the equine industry to regularly host field days, workshops, and grant funded initiatives.

Introduction

Kentucky has over 30,000 horse farms with over 200,000 horses (KY Equine Survey, 2012). The University of Kentucky Horse Pasture Evaluation Program began in 2005 in response to greater demand for pasture management information in the region, which was in part due to the crisis created by Mare Reproductive Loss Syndrome (MRLS) in the early 2000s (Webb et al., 2004). The program works with horse farms of all sizes to improve pasture management and utilization while reducing the need for stored feeds and the negative impacts of horses on the environment. Environmental impacts of horse grazing can include soil erosion and nutrient runoff due to close grazing, water contamination from direct access, and the spread of noxious weeds by allowing seed production. The University of Kentucky Horse Pasture Evaluation Program has four main goals: 1) improving pasture forage quality and quantity; 2) reducing tall fescue toxicity on breeding farms; 3) engaging undergraduates in pasture management as well as research techniques and extension programming; and 4) protecting on-farm natural resources by reducing the impact of horse grazing.

Methods

Farms enrolled in the University of Kentucky Horse Pasture Evaluation Program select the pastures and paddocks that they want to have evaluated. New farms often ask for the entire farm to be evaluated and returning clients may specify pastures of interest such as those with recent management changes or pastures where late term broodmares reside. Trained undergraduate and graduate students complete most of the evaluations, under the supervision of a research analyst.

Students collect botanical composition using the occupancy method (Payne et al., 2021). Sample quadrats, roughly 75 cm containing 25-15cm x 15cm squares, are randomly placed in 10-20 locations in the pasture, depending on size. In each square, the dominant species is recorded. This data is then averaged with other quadrats in the pasture to give the botanical composition of the pasture. Common species include tall fescue (*Schedonorus arundinacea* (Schreb.) Dumort), Kentucky bluegrass (*Poa pratensis* L.), orchardgrass (*Dactylis glomerata* L.), white clover (*Trifolium repens* L.) and nimblewill (*Muhlenbergia schreberi* J.F. Gmel.), as well broadleaf weeds, weedy grasses and bare soil. Recommendations are developed from these numbers. For example, a pasture with 14% broadleaf weeds would be considered “an option” for herbicide application, while a pasture with 37% bare soil would be “highly recommended” for seeding.

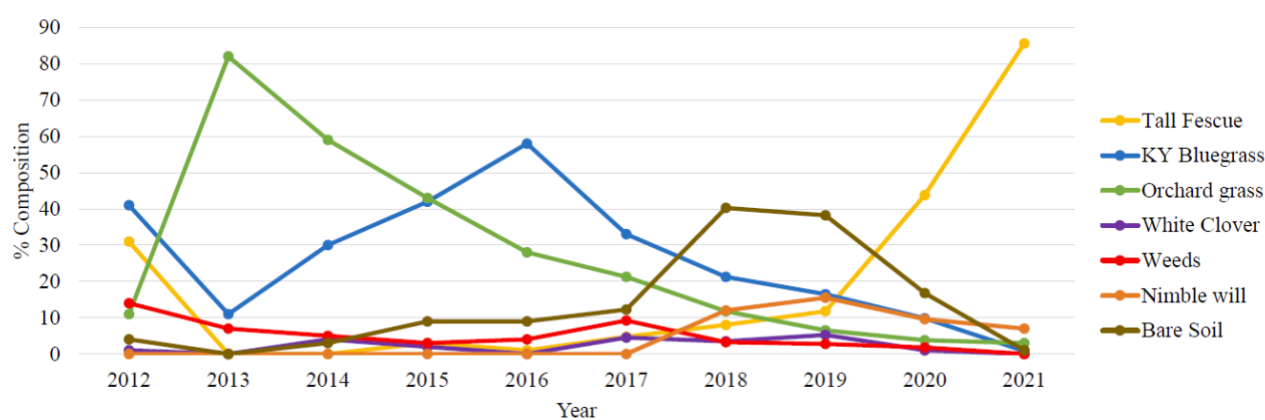
Additionally, samples of tall fescue are collected and analysed for endophyte presence and ergovaline concentration to evaluate tall fescue toxicity risk for late term broodmares (Lea et al. 2014). Because horses are likely to graze randomly through the pasture (Morrison et al. 2009), ergovaline in total diet can be calculated to account for the dilution that will happen in pastures with significant amounts of other forage

grasses. This measure of pasture toxicity is calculated by multiplying ergovaline concentration by the percentage of tall fescue found from all grazable forage species. Ergovaline in total diet (ppb) = %Tall Fescue/(%Tall Fescue+% Bluegrass+% Orchardgrass+% White Clover) * ergovaline (Lea and Smith, 2021.)

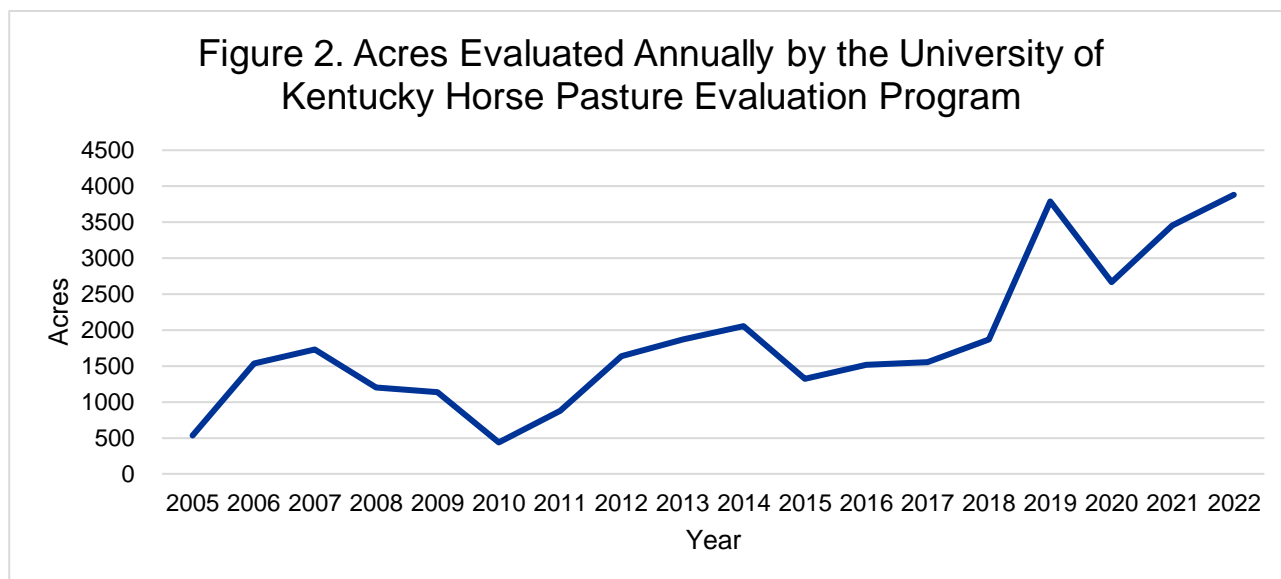
When pastures contain more than 50% undesirable species then complete pasture elimination is often recommended, using two applications of glyphosate or aggressive tillage, followed by reseeded. This renovation method has been a far more effective pasture improvement method compared to the traditional practice of incremental improvements by overseeding, herbicide applications and more. Broadleaf weeds, warm season annual grasses and bare soil are typically undesirable. Toxic tall fescue, or excessive white clover may also be considered undesirable on some farms. When all of these factors are combined, a surprising number of pastures meet the 50% criteria. More details about the programs recommendations and seeding practices can be found in *Horse Pasture Management, 1st edition* (Lea et al., 2018 and Smith and Lea, 2018)

Results and Discussion

The success of any agricultural program, including the pasture evaluation program, can be difficult to quantify, therefore the following example should be illustrative. Pasture M3 is broodmare pasture at the foaling barn of a large thoroughbred breeding farm in Woodford County, Kentucky.



In 2012, the pasture was found to have moderate levels of tall fescue, but the fescue had high percentage of endophyte infection along with high ergovaline levels, and therefore presented a significant risk to late term mares. The decision was made to remove tall fescue from the pasture using the herbicide Imazapic (Plateau®). The tall fescue was successfully killed, but the hot, dry late summer and fall led to significant stand mortality of Kentucky bluegrass, and the invasion of the warm season perennial weedy grass nimblewill into the resulting bare soil. By mid-fall, it was decided to kill out the pasture completely with glyphosate and start over with a complete re-establishment. The pasture was seeded in an orchardgrass/Kentucky bluegrass mixture. Orchardgrass established quickly as expected but declined over the next few years. Kentucky bluegrass increased each year through 2016. In 2017, the farm admittedly bought too many horses, and grazed this pasture and several others at very high stocking rates. The more intense grazing pressure combined with the hot dry summer of 2018 and the continued decline of orchardgrass, resulted in increased nimblewill, weeds, and bare soil. In the fall of 2019, the farm sprayed out the existing sod and overseeded the pasture with novel endophyte tall fescue, which established well and provided a safe grazing option for late term mares. Nimblewill, bare soil and weeds have all remained low in this re-established fescue dominate pasture. Based on the success of pasture M3, this farm has overseeded or completely re-established a number of other pastures. They have started growing their own hay and have learned to carefully evaluate stocking rates before purchasing new horses.



The program has enjoyed growth throughout much of its history, as illustrated in figure 2, showing the number of acres evaluated each year. While larger farms (over 600 acres each) have driven up the number of acres evaluated, small to medium sized farms continue to comprise the majority of farms. This program has actively sought to work with all Kentucky horse farms, regardless of size, breed or use.

Larger impacts of the University of Kentucky Horse Pasture Evaluation Program have been seen in the overall equine extension program. For example, there has been consistent high attendance and engagement at horse specific, forage related extension events. Pastures Please! is an annual winter equine program attended by more than 200 individuals and the University of Kentucky Equine Farm and Facilities Expo has been attended by 150 to 300 each summer.

The success of this program, along with excellent programs by other University equine extension faculty, has helped the University of Kentucky develop a regional reputation for expertise in horse pasture management. In 2016 a United State Department of Agriculture (USDA)-Natural Resources Conservation Service (NRCS)-Regional Conservation Partnership Program (RCPP) competitive grant was awarded to the University of Kentucky to work with local horse farms on natural resource conservation practices. This included funding for practices, field days and educational trainings for NRCS personnel on how to apply conservation practices to horse farms. In 2020, a follow-up USDA-NRCS-Conservation Innovation Grant (CIG) was awarded to study the ecological and economic impacts of this program. On-going sampling of participating farms has shown that practices such as rotational grazing can significantly improve pasture quality, soil cover and the economic viability of the farms.

Finally, undergraduates are not only a major workforce behind this program, but are also a profound connection to the horse owners and professionals of the next generation. Students that work for the University of Kentucky Horse Pasture Evaluation Program learn farm management concepts and research techniques and are exposed to a wide variety of extension programming, while getting paid and earning internship credit. Some of these students have had little to no experience with agriculture and leave with a much better appreciation for the work of farmers. Others are heavily invested equine students who learn valuable skills for when they are farm owners. Of the over 50 that have worked for this program since 2010, four have gone on to earn an MS degree in forages, and one currently holds a PhD in Forestry Conservation.

Conclusions and/or Implications

The University of Kentucky Horse Pasture Evaluation Program has been successfully assisting horse owners and managers in improving pasture management since 2005 by providing detailed sampling, tall fescue analysis, and field-by-field recommendations. The success of this program is evident based on improvements of individual pastures, by increased engagement of the horse industry, by success obtaining competitive grants, and the continued impact on students at the university.

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