Introduction

In 2005, the University of Kentucky (UK) Horse Pasture Evaluation Program was launched in response to the outbreak of Mare Reproductive Loss Syndrome in 2001/2002. While this event was eventually attributed to the population explosion of the Eastern Tent Caterpillar, many first assumed the widespread foal losses were attributed to the presence of naturally occurring toxic tall fescue (Schedonorus arundinaceus) (Schreb.) Dumort.) and caused many farm managers to give new and critical consideration to pastures. The University of Kentucky (UK) Horse Pasture Evaluation Program collects detailed data of pasture species composition, tests for tall fescue toxicity, and provides farm managers with comprehensive recommendations for management.

However, the amount of data collected and presented to farmers was overwhelming. In response to these challenges, the UK Horse Pasture Health Score Card was created in 2018 and consists of a ranking of 1 to 5 for 10 critical areas of pasture health as observed by a trained undergraduate. These criteria are based on the NRCS Pasture Health Score Card (Cegelsi et al., 2018) which includes: 1) desirable grass cover, 2) desirable grass diversity, 3) bare soil and warm season annual grasses, 4) bare soil and warm season annual grasses, 5) broadleaf weeds, 6) perennial weedy grasses, 7) braiding, 8) stage of growth, 9) leafing areas, and 10) thatch and color. Table 1 contains the score card chart, with each of the ten categories, and a description of the rankings for each.

Results

Desirable Grass Cover (Figure 1) is defined as the collective percent of tall fescue, Kentucky bluegrass, and orchardgrass. Thirty-six percent of pastures were scored correctly, and an additional 48% were scored within 1 point of the correct score and resulted in a normal distribution, suggesting that desirable grass cover can be closely estimated using the score card method.

Bare Soil and Warm Season Annual Grasses (Figure 2) are combined because these grasses, which include crabgrass (Digitaria sanguinalis), yellow foxtail (Setaria viridis), and goosegrass (Eleusine indica), will die off in the fall, leaving bare soil. Only 12% were scored correctly, but 56% were underestimated by 1 point. A normal distribution was observed, but was not centered over the midpoint. This suggests that the evaluators frequently underestimated the percentage of bare soil and warm season annual grasses. Additional training or an adjustment of the score card parameters may be needed.

Broadleaf Weeds (Figure 3) mainly includes broadleaf forbs (no legumes). The most common species were plantain (Plantago major and Plantago lanceolata), dandelion (Taraxacum spp.), common ragweed (Ambrosia artemisiifolia), and Carolina horsenettle (Solanum carolinense). While the distribution was heavily skewed to the right, 60% of pastures were scored correctly, with an additional 36% underscored by 1 point, suggesting this method provides a reasonably accurate estimation of broadleaf weeds in pastures.

Perennial warm season grasses (Figure 4) includes nimblewill (Muhlenbergia schreberi), johnsongrass (Sorghum halepense), and bermudagrass (Cynodon dactylon). Just 20% were scored correctly, with 44% underestimated by 1, and a normal distribution centered over -1. This suggests that these weedy grasses are frequently underestimated using the score card method and the score card may need to be modified.

Discussion

These results suggest that the UK Horse Pasture Health Score Card is not suitable for scientific research, but it has the potential for accurate and time efficient evaluation of large horse farms when used for general pasture management recommendations. Several categories, including desirable grass cover and broadleaf weeds, were accurately estimated, while other categories, such as bare soil/warm season annual grasses and perennial weedy grasses, were significantly underestimated. These results suggest that the score card may need to be modified and additional training should be developed for evaluators. Multi-year and multi-evaluator data will be needed to ultimately determine the accuracy of this method.

The most useful feature of the Pasture Score Card is the reduced time required to evaluate large farms, and the simplicity of data generated. It is estimated that the UK Horse Pasture Health Score Card can be completed 8-10 times faster than the occupancy method, and generates significantly less data for farms to consider. Both provide the same management recommendations, but the score card data is less time consuming to collect, analyse, and review. Once perfected, the Score Card should allow more land area to be covered at a reduced cost to landowners.

Methods and study site

In 2020, an undergraduate intern’s research project was to compare the Horse Pasture Health Score Card to traditional botanical composition data from randomly selected client pastures. For each pasture, the student walked a semi-circular pattern around the pasture and scored the pasture using the score card. Species composition was then determined using the Occupancy Method. Occupancy grids were 0.7 x 0.7m wire mesh, containing 25 squares (each 15 x 15cm) and the grid samples were taken from 10-20 random locations in each pasture, depending on pasture size.

For the four categories that can be quantified (desirable grass cover, bare soil and warm season annual grasses, broadleaf weeds, and perennial weedy grasses), the score given was compared to the score it should have received based on the actual botanical composition data. The given score is then subtracted from the actual score. For example, if a pasture should have received a score of 3 based on botanical composition, but was scored 4 instead, then it was incorrectly scored by 1. For desirable grass cover, bare soil and warm season annual grasses, perennial broadleaf weeds, and perennial weedy grasses, the given and correct scores were compared to evaluate the accuracy of this method.

The objective of this research was to compare accuracy and efficiency of the traditional occupancy method for botanical composition with the UK Horse Pasture Health Score Card.

Acknowledgements

The authors would like to thank UK interns Reilly Fardy (2020), Kelsey Hargadon (2019), and Sydney Beidleman (2015-2018) for their work on this sample method. Additionally, the UK Horse Pasture Evaluation Program could not function without the assistance from countless undergraduates and summer employees. Finally, the authors would like to thank Pin Oak Stud for allowing the testing of this method.