

Nutritive Value of South-Central Kentucky Forbs

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Abstract. South Central Kentucky pastures serve as a host for a plethora of forbs found throughout the Upper South and Midwest United States. In this region, forbs can be numerous within pastures that are under-managed. Many producers view forbs as unwanted or weedy species and may not fully understand the value that some of these forbs provide to beef cattle. With little scientific information found on the subject for the specific geographic area, the purpose of this study was to determine what types of forbs will provide adequate nutrition for lactating beef cows. Three pastures from separate farms were used for this study. Botanical composition was assessed monthly starting in March and continuing through October 2022. Vegetative material from the five most numerous forbs was collected along with tall fescue, a predominate perennial forage, and submitted to a forage lab for quality testing using wet chemistry. Crude protein (CP), total digestible nutrients (TDN), sodium (Na), and copper (Cu) were reported for this presentation. The forbs were classified as palatable and non-palatable and compared to tall fescue. The results showed indicate the palatable forbs and tall fescue generally supported the nutritional requirement of a lactating beef cow. Overall, palatable forbs showed a higher TDN, CP, and Cu levels in comparison to tall fescue and the non-palatable forbs. In summary, it was found palatable forbs retained higher nutritive value than tall fescue and non-palatable forbs and met the nutritional requirements for a lactating beef cow apart from Na.

Introduction

Pasture species should contain sufficient forage quality and mineral composition for grazing livestock or supplement will be required. Pasture forbs can be a significant contribution to the botanical composition of many pastures in the South-Central USA. Digestibility of forbs and grasses decline with increased temperature and increasing fiber content (Elgersma et. al., 2013). (Marten and Andersen (1975) discovered that of the 12 forbs species included in their USA research study all had high enough concentrations of macrominerals to adequately supply the requirements of ruminants. A lactating beef cow nutritional requirements 60 days post calving is 10 to 12 percent CP and 60 TDN (Ball et. al., 2015). Sodium requirements are 0.06 to 0.08 percent DM intake 60 days pre-calving and 0.10 percent DM intake 60 days post-calving (Johns et. al., 2003). The minimum CU requirement is 10 parts per million (ppm) (Harvey et. al., 2021). The objective of this study was to determine if commonly occurring forbs can supply the nutritional requirements for lactating beef cows in South-Central Kentucky pastures in comparison to the commonly occurring grass species tall fescue (*Schedonorus arundinaceus* (Schreb.) Dumort., nom. Cons.

Methods

Three pastures located in South Central Kentucky (USA) were used for this research project, specifically Lincoln and Pulaski counties. Producer's fields were carefully screened to determine if they qualified for this study using the following criteria. Qualifying pastures could not have been sprayed in the past year with any type of herbicide and could not be sprayed with herbicides for the duration of the study. Before detailed botanical composition, each pasture was visually evaluated to make sure it was suitable for this type of research. The participating producer understood the pasture included in the study must remain a grazed pasture for the entire length of the research. No rent was paid for the pasture locations. Producers could manage these pastures according to their normal practices, except for spraying herbicides and cultivation.

Each of the three pastures was sampled once a month on the second or third week of each month. Pasture botanical composition was determined using the occupancy grid method. A small square shaped wire panel with 25-15cm squares was used on all locations. (Figure 1).



Figure 1. Photograph of the wire grid used to access pasture botanical composition.

When this grid was placed on the ground, each square is examined separately starting from the top left and working to the bottom right. The predominant forage/forb within each one of the 25 squares was recorded on a field sheet. The occupancy grid was randomly placed within a pasture at 20 different locations following a Z shaped pattern. The distribution of sampling and the number of samples taken within each pasture provided an accurate estimation of pasture composition. If a forage species could not be correctly identified in the field, University of Kentucky Forage and Weed Specialists were contacted to help aid in identification. The app “Picture This” was also purchased to help identify species.

Once pasture composition analysis was completed for each field, the five most prevalent forbs within that field were collected and placed in a gallon ziplock bag. Small styrofoam shipping coolers with one cold pack were used to ship the forbs and grasses via United States Postal Service. Samples collected from the fields were shipped the same day. If forage samples were not shipped the same day, the samples were placed in a freezer until shipping. Dairy One forage laboratory (<https://dairyone.com/>) was used to analyze the samples for both quality and mineral content using the “Basic plus Minerals” wet chemistry test.

Lab results were analyzed to determine whether they met, exceeded, or fell short of the required nutritional needs of a lactating beef cow. Ultimately, this determined if these forbs were as nutritional as tall fescue and if they were beneficial in a pasture mix. For a forb to be classified as beneficial, it had to meet or exceed the nutritional requirements of a lactating beef cow 60 post calving. For the sake of conciseness, this study only focused on the forage quality parameters CP and TDN and the mineral content for Na and Cu in the analyzed forbs and tall fescue.

Results and Discussion

The predominate 12 weed species in these pastures included: purple dead nettle (P) (*Lamium purpureum*), Philadelphia fleabane (P) (*Erigeron philadelphicus*), buttercup (NP) (*Ranunculus*), chicory (NP) (*Cichorium intybus*), dandelion (P) (*Taraxacum*), curly dock (P) (*Rumex crispus*), narrowleaf plantain (P) (*Plantago lanceolata*), tall ironweed (NP) (*Vernonia gigantea*), common elephant’s foot (NP) (*Elephantopus tomentosus*), poverty rush (NP) (*Juncus tenuis*), cocklebur (NP) (*Xanthium strumarium*), and yellow foxtail (NP) (*Setaria pumila*). The forbs identified were classified as palatable (P) or non-palatable (NP) depending on whether they were consumed by the cattle grazing these three pastures. Although there were many grass species present, tall fescue was used for comparison purposes since it is a commonly occurring perennial grass species in this region.

The majority of the forbs in the study pastures, both palatable and non-palatable, had CP and TDN levels high enough to support a lactating beef cow. The concentration of the micromineral Na was always under the threshold to support the requirement for a lactating beef cow 60 days post-calving, with the exception of the non-palatable forb buttercup. Copper was always in an acceptable range except for a few of the forbs. Once these values were averaged, the palatable and unpalatable forbs showed acceptable CP (> 12%), TDN (> 60%) and Cu (> 10 ppm) levels to sustain a lactating beef cow, but Na content was insufficient.

In comparison to tall fescue, the forbs generally showed higher nutrient availability (Figure 1). The average tall fescue CP content across the grazing season was 15.1% in comparison to a CP content of 16.3% for the non-palatable forbs and 20% for the palatable forbs. The TDN of tall fescue averaged 60.9% and the non-palatable forbs had a TDN of 62.9% and the palatable forbs were 65.6% TDN. Sodium levels were low across all species, but the forbs did show a slightly elevated level of Na over tall fescue. The Na content for the non-palatable forbs was 0.02%, palatable forbs 0.01%, and tall fescue 0.01%. Copper levels averaged 12.1 ppm for non-palatable forbs, 13 ppm for palatable forbs and 7.1 ppm for tall fescue. The results from this study indicate that the forbs generally contained higher nutritional value in comparison to tall fescue during the summer of 2022 in South Central Kentucky (Figure 1).

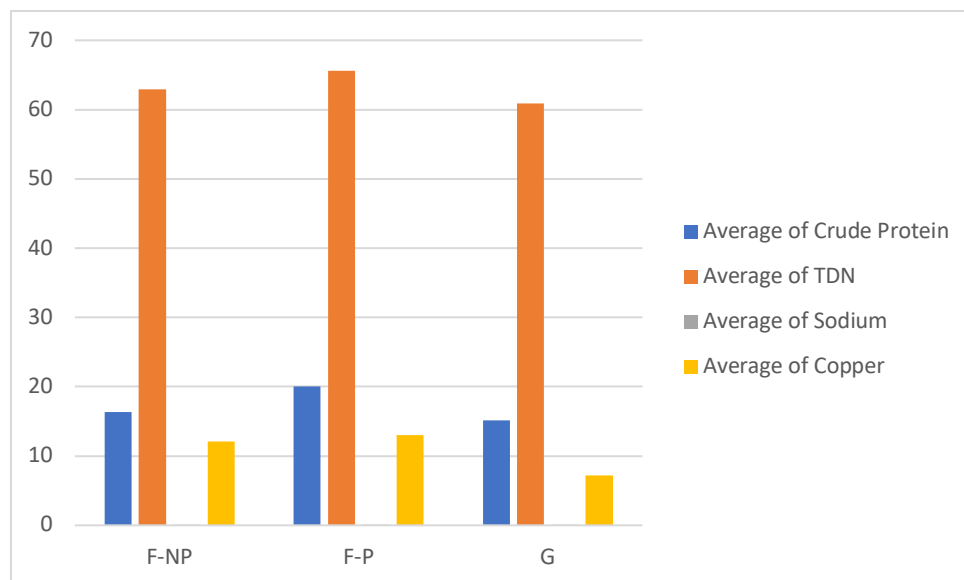


Figure 1. The average forage quality and mineral composition of forage species in three pastures in central Kentucky during 2022 - F-NP: Non-Palatable Forbs; F-P: Palatable Forbs; G: Grasses of all species found in the pastures.

Conclusions and/or Implications

In conclusion, it was determined that both forbs and grasses, when maintained in a vegetative stage in pastures, could adequately support the CP and TDN requirements of a lactating beef cow. The forbs contained adequate levels of Cu for lactating beef cows in contrast to grasses. The Na content was consistently below accepted levels for all species and additional supplementation of this required mineral should be made available. The results showed that forbs can often meet the nutritional requirements for grazing livestock, but it is important to analyse all pasture species for required forage quality and mineral content and formulate needed supplementation based on this information. Forbs are rarely grazed alone so the contributing factor they would have towards supporting a lactating beef would be contingent upon pasture composition of those forbs.

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