

## **FORAGE PRODUCTION, DEER USE, AND SEASONAL CRUDE PROTEIN OF THREE COOL SEASON FORAGES IN THE GEORGIA PIEDMONT**

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### **INTRODUCTION**

Many land managers use supplemental food plots to compensate for deficiencies in quality or quantity of native forage. Cool season forages can concentrate deer during hunting season and provide additional food from fall through spring. Many varieties of cool season annuals or perennials will provide forage. The choice of a crop depends on many factors. Time of year, soil pH, site location, soil drainage, temperature, available soil nutrients, possible pest problems, and the amount of rainfall are just some things to consider.

White clover (*Trifolium repens*) is the most widely planted pasture legume for livestock. It has excellent reseeding ability, aggressive running stolons, and broad adaptability to a wide range of climate conditions. Researchers in northeast Georgia have reported that ladino clovers provided an average of 24% crude protein for three years. Regal is a variety of ladino clover that provides high quality, year-round forage for deer, especially between April and November. One study at the University of Georgia found that out of eight cool season forages, Regal ladino clover was the forage utilized the most throughout the study. Another study evaluated three varieties of ladino clover and found that Regal ladino was the most economical forage to purchase for the nutrition it provided.

Durana clover is a cross between intermediate-leaved common types of white clover. It offers landowners a legume that provides increased stand persistence without giving up production. Durana has smaller leaves than ladino clovers, but produces more stolons, which enable the legume to grow vigorously in heavy soils. In cattle grazing tests, it is more suited than Regal clover to withstand grazing pressure, drought and other stressful conditions. However, there are no studies comparing Durana clover to Regal clover for use in wildlife food plots.

Tall fescue (*Festuca arundinacea*) is a cool season perennial grass. It is the most widely grown grass in the United States, covering nearly 35 million acres. It is adaptable to a wide range of soils and offers grazing throughout most of the year. Tall fescue has many desirable agronomic characteristics. However, it has not been used in supplemental food plots for deer because of low palatability and the presence of a toxic fungal endophyte. Consumption of the endophyte toxins can result in reduced reproduction and low weight gain in livestock. Thus, fescue is often eradicated from wildlife food plots in favor of more suitable wildlife forages. A new variety of fescue, MaxQ, has been developed with a non-toxic “beneficial endophyte”. This non-toxic endophyte furnishes the excellent livestock performance of endophyte-free tall fescue with the toughness and persistence of the original grass varieties. However, no research has been conducted on deer use of MaxQ fescue.

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We studied forage production, use by white-tailed deer, and seasonal crude protein levels of MaxQ fescue, Regal ladino white clover, and Durana white clover. Our objective was to determine forage production and seasonal use by white-tailed deer of Regal ladino white clover, Durana white clover, and MaxQ fescue when planted alone and in combination. We assessed the adaptability of these forages to the Blue Ridge physiographic region of Georgia and evaluated the nutritional quality of each of these forages as measured by crude protein content.

## STUDY AREA

The Piedmont site was located in Putnam County, Georgia on the B. F. Grant Wildlife Management Area. Soils of the Piedmont site were on well-drained Cecil sandy loam soils with slopes ranging from 2 to 6%. Deer densities ranged from 44 to 54 deer per mi<sup>2</sup>.

## METHODS

Prior to planting, we conducted soil tests and applied fertilizer and lime according to recommendations. We established one food plot on each site. Each food plot was 2.5 acres divided into five equal size subplots. We planted each subplot in pure Regal ladino clover (7.5 lb/ac), pure Durana clover (7.5 lb/ac), pure MaxQ fescue (17.5 lb/ac), a combination of MaxQ fescue and Regal ladino clover (7.5 lb/ac; 4.5 lb/ac), and a combination of MaxQ fescue and Durana clover (7.5 lb/ac; 4.5 lb/ac). Prior to planting, we mowed and harrowed each site to remove existing vegetation and minimize weed competition. All clover seed was purchased pre-inoculated with appropriate *Rhizobium*. For the purposes of this report, we will only discuss the pure plots and not confuse things with the combination clover-fescue plots for now.

We randomly placed three exclosures on each subplot to prevent deer browsing. The exclosures were each about 1.5 feet in diameter and 4 feet tall and excluded deer from only a small area of the food plot. During each month of the study, we clipped all plants inside each exclosure to a uniform height of one inch from the ground. We also clipped an equal area outside of each exclosure to determine forage use. We placed the clipping samples into separate paper bags and labeled them for identification. We clipped each sub-plot about once every 30 days. After each sampling, we moved the exclosures to a new randomly chosen location within subplot. We dried and weighed all samples from each monthly clipping. We used the dry weight of forage to estimate production and use of each clover type based on standard mathematical formulas expanding clipped area to per acre values

We estimated monthly production from the dry weight of forage inside the exclosure minus the dry weight of forage from outside the exclosure in the previous month. For example, there might be 1200 lb/ac of forage on the food plot in the month of September (based on the amount inside the exclosure). However, since the deer have access to all the forage outside the exclosure they might consume enough so that only 700 lb/ac of forage was present on the food plot in August. Then by using the formula to calculate production, we would subtract 700 lb/ac (the dry weight of forage from August) from 1200 lb/ac (the dry weight of forage from September) and come up with a 500 lb/ac of production.

## RESULTS

Production for Durana clover ranged from a high of 1592 lb/ac (1961 kg/ha) in June to lows of zero in September and December (Figure 1 and 2). Production for Regal clover ranged from a high of 1238 lb/ac (1609 kg/ha) in May to lows of zero in September to February. Production for fescue ranged from a high of 1286 lb/ac (1572 kg/ha) in June to a lows of zero in August (Figure 3). Deer use of the Durana plots ranged from a high of 1410 lb/ac (2056 kg/ha) in June to lows near zero in October to

February. In our study production exceeded use in April, May and June 2003. Use exceeded production from July 2003 until September 2004 (Figure 1). We observed a similar trend for Regal (Figure 2).

The story was different, however, for MaxQ fescue. Production exceeded use from April 2003 through July 2003 and again for September 2003 to May 2004 except during November. In this study, use of the fescue was less than 500 lb/ac in all months (Figure 3).

The forage quality of Durana and Regal, as measured by protein content, was consistently higher than MaxQ fescue throughout the study (Figure 4). Both clovers averaged between 18.3 and 20.0 % crude protein in all months while MaxQ fescue ranged from 8.2 to 16.8 % over the study period (Figure 4).

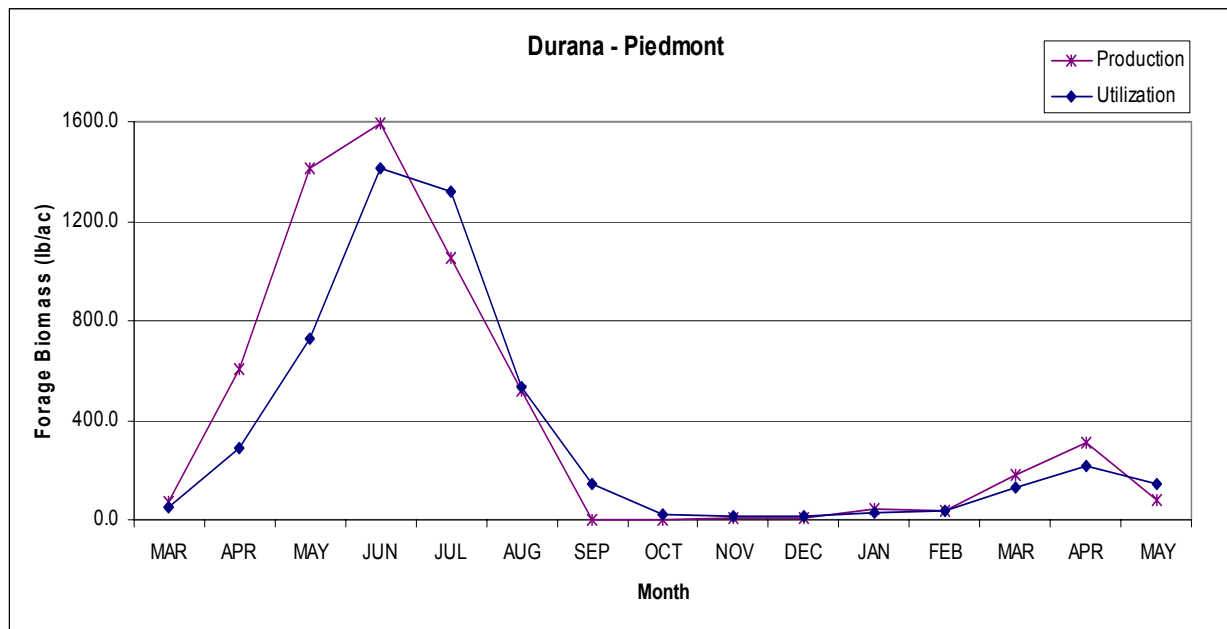


Figure 1. Forage biomass (lb/ac) of Durana clover on food plots in the Piedmont physiographic province of central Georgia from April 2003 to May 2004.

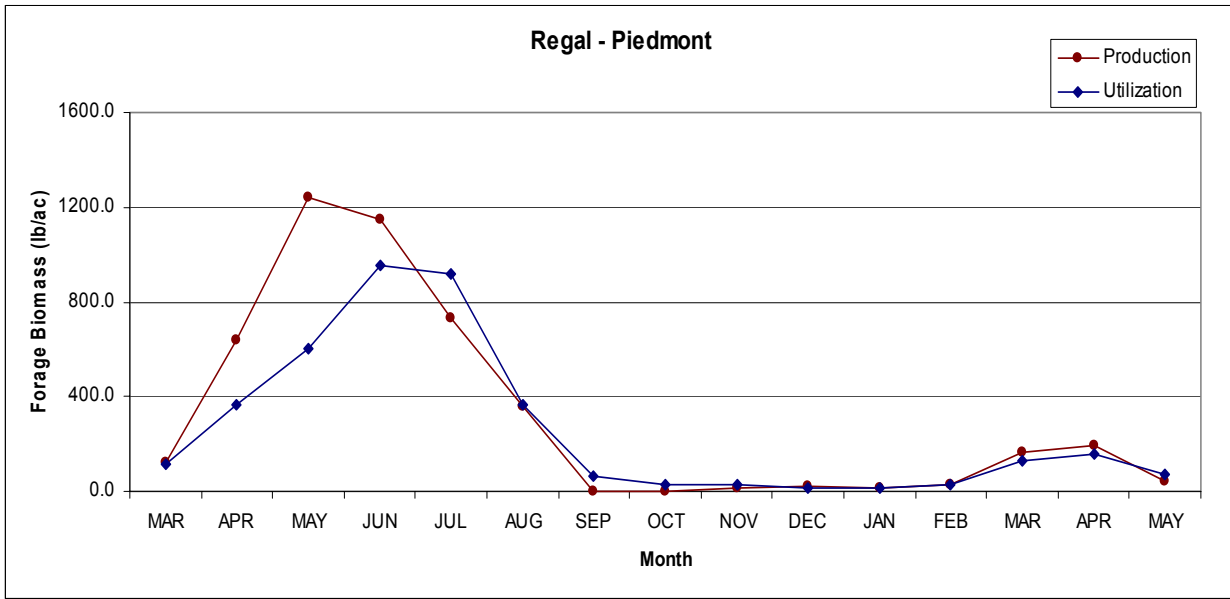


Figure 2. Forage biomass (lb/ac) of Regal ladino clover on food plots in the Piedmont physiographic province of central Georgia from April 2003 to May 2004.

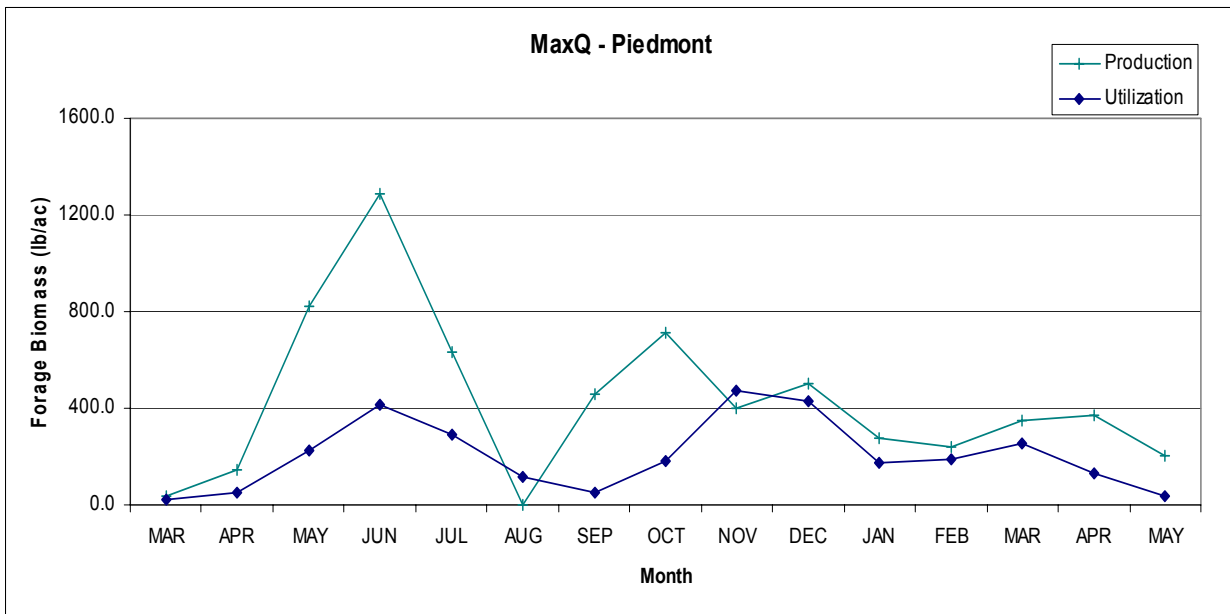


Figure 3. Forage biomass (lb/ac) of MaxQ fescue on food plots in the Piedmont physiographic province of central Georgia April 2003 to May 2004.

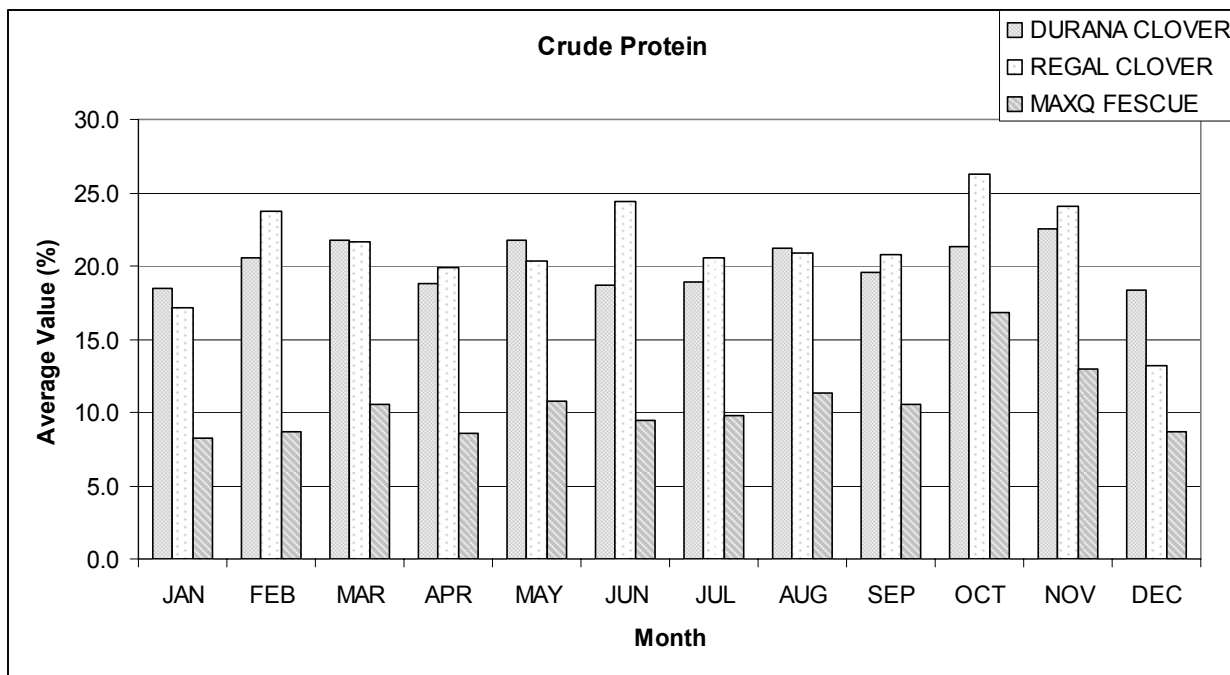


Figure 4. Monthly average crude protein values (percent) for two varieties of white clover and MaxQ tall fescue planted in food plots in the Piedmont physiographic province of Georgia from April 2003 to May 2004.

## DISCUSSION

We mowed the study plots in August 2003 and fertilized during September 2003 and March 2004 soon after we completed data collection for the month. Overall production was somewhat consistent among forages.

Deer generally used the two clovers similarly but MaxQ fescue was used the least. In addition to production and use, we used crude protein as an indicator of forage quality. This measure of quality is an important consideration when determining what forages to plant to provide supplemental nutrition. The forage quality of Durana and Regal was similar over the study period. Both provided over 20% crude protein during all 12 months of the year. MaxQ fescue had the lowest average crude protein of all tested forages during the study. This may explain why the clovers were preferred over MaxQ fescue during all sampling periods. MaxQ fescue tested only between 8 and 11% crude protein all 12 months. For that reason, we suggest not planting MaxQ fescue as a food plot crop but rather use the high quality, highly productive clovers.

## CONCLUSION

The ideal forage for deer would be one that produces year-round, high-quality forage that is preferred by deer. In general, many high-quality forages do not tolerate extreme weather conditions compared to low-quality forages. However, perennial white clovers, such as Durana or Regal ladino, appear to provide a satisfactory combination of high nutrition and tolerance of harsh conditions.

Although we only measured production for one year, based on past cattle grazing studies at University of Georgia experiment stations, we predict that during the next few growing seasons, Durana will maintain more complete stand coverage than Regal because of Durana's tolerance to heavy grazing, extreme weather conditions, and its inherently competitive nature due to higher stolon density. We conclude Durana will provide high quality perennial forage for more than two years.

MaxQ fescue has the potential to provide an enormous amount of forage and it grew well in our study areas. However, given the relatively low use and low crude protein levels, MaxQ is inferior to either of the clovers for planting in food plots. Although MaxQ fescue could be considered for planting in some situations, such as highly erodable sties, the high productivity, preferred use, high nutrient content, and tolerance to grazing of the two varieties of clover clearly make them the plantings of choice

## **ACKNOWLEDGMENTS**

The Daniel B. Warnell School of Forestry and Natural Resources supplied a graduate research assistantship (Stephens) and Pennington Seed provided seed and fertilizer. The study area was located on the B.F. Grant Wildlife Management Area and properties belonging to the Warnell School of Forestry and Natural Resources.

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