

Estimating Sward Forage Mass and Crude Protein



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INTRODUCTION

Measuring forage mass (FM) should be an integral part of pasture management, but forage quality should also be considered. A mobile rising plate has been used to estimate FM, and with a Greenseeker® optical sensor (Figure 1), simultaneous estimates of FM and NDVI were obtained.



Figure 1. Forage estimator "sled".

PROCEDURE

Multiple regression was used to separate factors affecting NDVI readings related to FM from those that might relate to sward crude protein (CP) in bermudagrass pastures. Stepwise multiple regression was performed using FM as the dependent variable and pasture plate height and NDVI as independent variables. Multiple regression was then performed using CP as the dependent variable and plate height and NDVI as independent variables to partition those effects. The same procedure was used in smooth brome grass and tall fescue pastures.

RESULTS

For bermudagrass, multiple regression with FM as the dependent variable and plate height and NDVI as independent variables showed that only plate height was related to FM ($r=0.98$, data not shown). Using the same procedure with pasture CP as the dependent variable, the relationship in Figure 2 was obtained.

Brome grass forage CP (3 pastures, 8 dates) was regressed against plate height and NDVI data. The relationship between sampled and predicted CP is in Figure 3.

Tall fescue showed no overall relationship between NDVI and CP across sampling dates (Figure 4), particularly in first and last sampling dates.

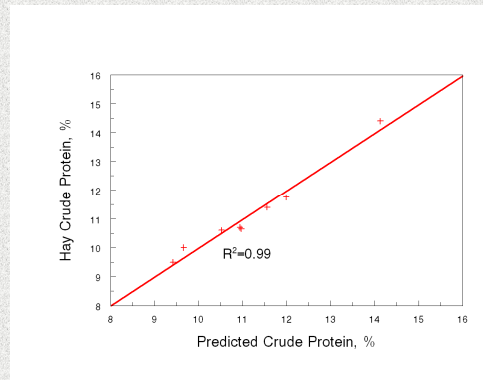


Figure 2. Relationship between bermudagrass hay crude protein and crude protein predicted from regression derived by using pasture forage estimator plate height and NDVI.

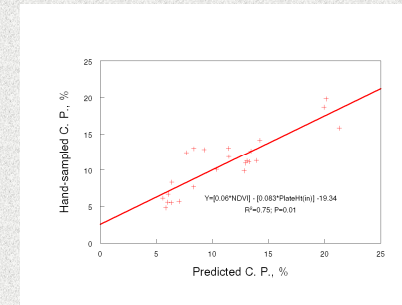


Figure 3. Relationship between crude protein sampled from brome grass pastures during the 2008 growing season and crude protein predicted from the equation derived by using pasture forage estimator plate height and NDVI.

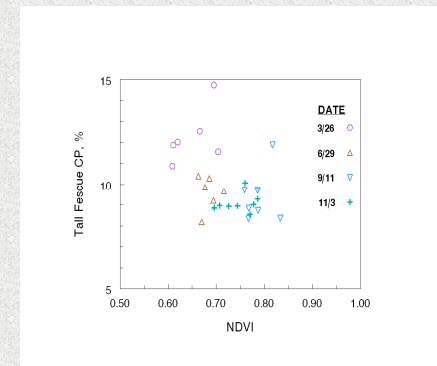


Figure 4. Relationship between crude protein sampled from tall fescue pastures on four dates in 2009 and average NDVI reading of the pasture.

CONCLUSION

Estimation of FM and CP by this method may be satisfactory for some applications, if properly

calibrated. The seasonal changes that seemed to occur in tall fescue leaf reflectance characteristics (Fig 4) emphasize the need for specific calibrations.