

Conservation Reserve Program Hay Quality from Producer Submissions to a Commercial Laboratory in Central Nebraska

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Abstract

The Conservation Reserve Program (CRP) sets aside hectares to be permanent grassland and keeps those acres out of rotation for agricultural use. In drought conditions, these acres open to emergency haying and grazing. CRP hay is harvested at the end of the primary nesting season, mid to late summer, therefore this is a very mature product for stored forage. Many beef cow producers in the Midwest feed CRP hay in the last third of gestation until cattle can be turned out for spring grazing. Data was obtained from CRP hay samples to evaluate forage nutritive value and supplementation needs relative to gestating beef cow requirements. Crude protein, ADF, aNDF, and NDFD48 ranges and means all indicated that overall CRP hay forage quality is poor. In fact, 90.07% (n = 508) of the samples would require producers feeding gestating beef cows to provide extra supplementation based on crude protein, TDN, or both. These results show that if beef producers must feed CRP hay, then laboratory analysis will be a valuable tool for determining the precise level of supplementation required to meet beef cow nutritional requirements. However, these results paired with recent wildlife management studies show that grazing at reduced stocking rates during nesting season may be the best alternative to optimize forage quality utilization on CRP acres as well as provide the benefit of more variable grassland habitat to increase avian species diversity on these lands.

Introduction

The Conservation Reserve Program was originally established to convert erodible crop land into permanent cover and has since evolved to include environmentally sensitive land and to preserve wildlife resources (Bjerke 1991). The program is administered by the U.S. Department of Agriculture (USDA) and the Farm Service Agency (FSA). The program is voluntary and pays agricultural producers to keep sensitive lands out of production (FSA 2021). These CRP lands open to emergency haying under drought conditions to relieve livestock producers in forage supply shortages, but only after primary nesting season (FSA 2021). Primary nesting season in Nebraska and surrounding states is July 15th (Nebraska, Kansas, Colorado, Wyoming, Montana) or August 1st (South Dakota, Iowa, Minnesota). Cow-calf producers in the Midwest typically utilize this forage to feed gestating beef cows and stretch available feeds through the winter until spring grazing. In this paper I present forage quality indicators relative to the nutrient requirements of a gestating beef cow from CRP hay samples submitted by producers to Ward Laboratories, Inc. (Kearney, NE) from 2012 to 2021. I hypothesize that CRP hay being harvested late in the season and allowed to grow uninhibited perhaps over several prior seasons, will require protein and energy supplementation potentially impacting the decisions beef producers should make to provide forage to cows in drought years.

Methods

Records of hay samples with CRP in the description that were scanned with NIRS Forage and Feed Testing Consortium (NIRSC) grass hay calibrations were obtained from the Ward Laboratories, Inc. database (n = 564). Figure 1 shows the geographic locations for each sample submitted by zip-code.

Forage quality parameters identified for examination were crude protein, acid detergent fiber (ADF), amylase-treated neutral detergent fiber (aNDF) and neutral detergent fiber digestibility at 48 hours (NDFD48). Some records contained NDFD48, while earlier records did not have this constituent included. A one-way ANOVA analysis and t-test were performed on crude protein, ADF and aNDF to determine if analysis of the sub-set (n=290) of samples containing NDFD48 values would yield the same results. Protein was not statistically different between the two groups, however ADF and aNDF were ($P < 0.05$). Therefore, nutrient values for crude protein, ADF, aNDF were summarized on all 564 CRP hay samples submitted to the lab from 2012 to 2021 and NDFD48 on the 290 sample sub-set.

I went on to compare crude protein in the hay samples to requirements of a gestating beef cow as defined by the Nutrient Requirements of Beef Cattle (NRC 2000). Furthermore, Total digestible nutrients (TDN) was calculated based on ADF using the following equation (American Feed Manufacturers Association 1981):

$$4.898 + (89.796(1.0876 - (0.0127 \times \text{ADF})))$$

TDN was compared to requirements of a gestating beef cow as defined by the Nutrient Requirements of Beef Cattle (NRC 2000).

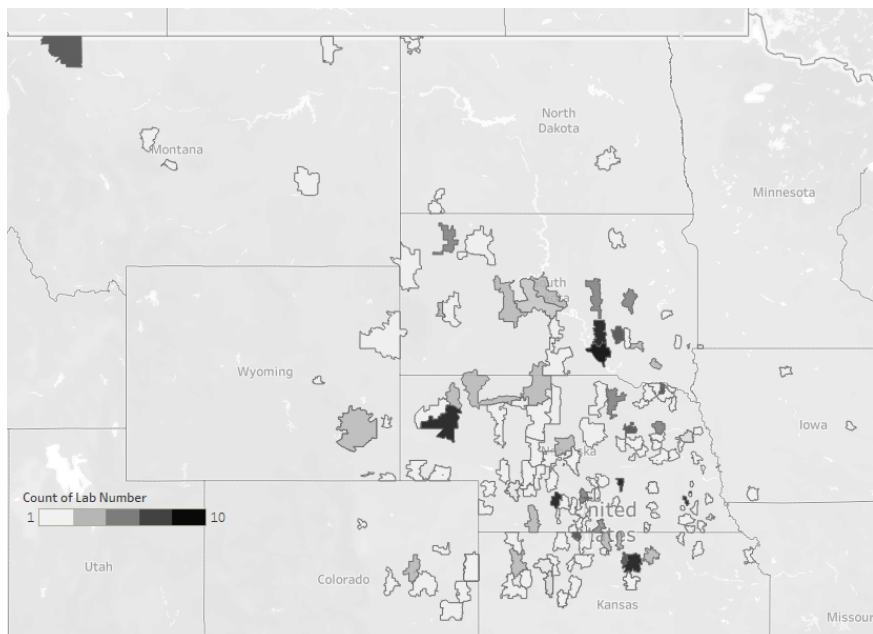


Figure 1. CRP hay samples submitted to Ward Laboratories, INC. by zip-code.

Results and Discussion

Distribution of Nutrients

Crude protein ranged from 0.20 to 20.80 % dry basis with a mean of 6.38 % dry basis (SE = 0.11). Grass hay is categorized by the USDA for forage quality on the basis of crude protein and the majority of these samples would be considered fair. Acid detergent fiber ranged from 29.6 to 57.90 % dry basis with a mean of 46.27 % dry basis (SE = 0.18). Amylase-treated neutral detergent fiber ranged from 39.30 to 83.40 % dry basis with a mean of 67.74 % dry basis (SE = 0.25). Higher fiber concentrations are typically indicative of lower forage quality. The range for NDFD48 was 16.00 to 67.00 with a mean of 43.27 (SE = 0.48). The distribution of these key forage quality parameters is visualized in Figure 2.

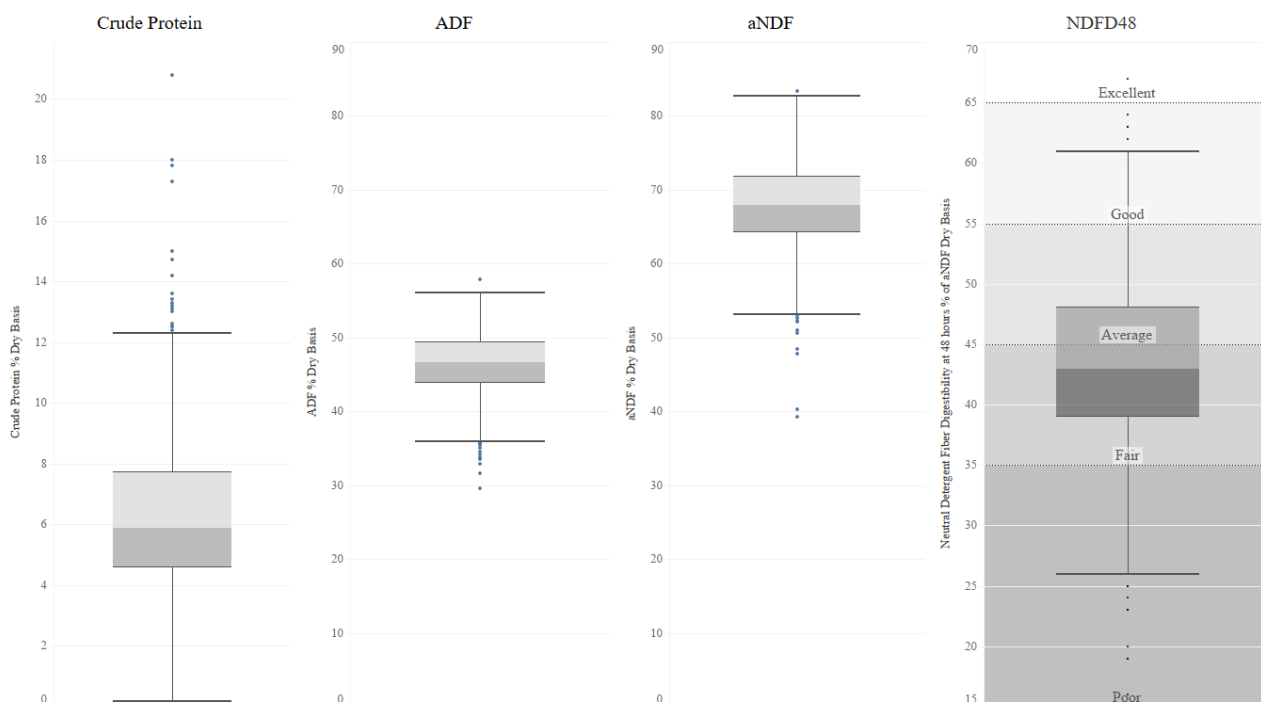


Figure 2. Distribution of forage quality parameters crude protein, ADF, aNDF (n = 564) and NDFD48 (n = 290) in CRP hay.

Furthermore, NDFD48 is a widely used laboratory analysis used to classify and characterize grass hay quality (Hoffman et al. 2001). If NDF digestibility is high, then animal performance increases (Oba and Allen 1999). Only 4.48% (n=13) of the CRP hay samples had NDFD48 values that would be categorized above average, good or excellent. 35.17% (n=102) of the CRP hay samples were categorized as having average NDF digestibility. Finally, most samples (60.35%, n = 175) had NDFD48 values below average classified as fair or poor. These results are in alignment with Sedivec and Soiseth's results from studying of CRP hay quality in North Dakota (1998).

Supplementation need for Gestating Beef Cows

Based on our geographical location and typical consultation experience, I decided that many of these submitted samples would be fed to gestating beef cows in their final third of pregnancy. The emergency CRP hay would most likely be baled and stored in the late summer or early fall and reserved to stretch beef herds to spring calving. The required nutrient density of beef cows in this physiological state regardless of variable weight, dry matter intake requirements and pounds per day requirements are 7.9% crude protein and 54% TDN on a dry basis (NRC 2000). 76.42 % (n = 431) of the CRP hay samples had crude protein concentrations less than the requirement. Additionally, 81.56% (n = 460) of the CRP hay samples had TDN lower than the requirement. Overall, 90.07% (n = 508) of the CRP hay samples would require supplementation of protein, energy, or both.

Emergency grazing may also be employed during drought conditions. According to the FSA, emergency grazing is allowed up to 90 days outside of primary nesting season and at 50% carrying capacity under specific conditions, during primary grazing season (2021). Forage quality declines with the maturity of the plant (Ball et al. 2001). Therefore, it would be optimal to graze during nesting season at reduced animal units in drought years. Producers can maximize the nutritional value of forages fed across their operation by timing hay harvest in pastures to match forage quality parameters, while grazing their CRP lands when authorized.

Furthermore, there are several recent studies showing that incorporating grazing into CRP acres may enhance avian habitat. Millenbah et al. found that unmanaged CRP lands had a declining benefit to bird species abundance, diversity, and productivity (1996). Management methods including haying, burning, grazing, and disking and interseeding were found to enhance vegetation and avian species diversity (Negus et al. 2010). Finally, while grazing during primary nesting season may have some short-term deleterious effects on avian reproduction, these effects are outweighed by the long-term effect of variable forage densities and heights to support a greater variety of grassland bird species on CRP lands (Kraus et al. 2021, Wilson et al. 2022).

Conclusions and/or Implications

Overall, forage quality of CRP hay submitted by producers to our laboratory were poor. Therefore, supplementation for major nutrient requirements, protein, and energy is needed on the majority of CRP hay. Laboratory analysis should be employed to determine at what level supplementation is required when feeding CRP hay. Due to the low quality of the hay, cow-calf producers should work with their FSA administrator to determine if grazing CRP lands and haying other pastures earlier in the season for higher quality hay for stored forage in drought conditions would be a viable option.

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References

- Bjerke, K. 1991. An Overview of the Agricultural Resources Conservation Program. Symposium Proceedings: *The Conservation Reserve Yesterday, Today and Tomorrow.*, 7-10.
- Farm Service Agency (FSA). 2021. CRP Haying and Grazing Emergency and Non-Emergency Use. U.S. Department of Agriculture Factsheet, 1-3.
- Grass Hay (2011-2021). Protein, ADF, NDF, NDFD48. NIRS Forage and Feed Consortium, Berea, KY. Foss, DS2500, ISIScan.
- National Research Council (NRC). 2000. Nutrient Requirements of Beef Cattle.
- American Feed Manufacturers Association. 1981. Proceedings 41st Semi-annual Meeting Lexington, KY. 16-17.
- Oba, A and Allen, M.S. 1999. Evaluation of the Importance of the Digestibility of Neutral Detergent Fiber for Forage: Effects on Dry Matter Intake and Milk Yield of Dairy Cows. *Journal of Dairy Science.*, 82:589-596.

- Hoffman, P.C., Shaver, R.D., Combs, D.K., Undersander, D.J., Bauman, L.M., and Seeger, T.K. 2001. Understanding NDF Digestibility of Forages. *University of Wisconsin Focus on Forage.*, 3(10):1-3.
- Sedivec, K. and Soiseth, C. 1998. Quality of Hay from CRP Lands in North Dakota. *Rangelands.* 20:3:38-40.
- Ball, D.M., Collins, M., Lacefield, G.D., Martin, N.P., Mertens, D.A., Olson, K.E., Putnam, D.H., Undersander, D.J. and Wolf, M.W., 2001. Understanding forage quality. *American Farm Bureau Federation Publication.*, 1(01), 4.
- Millenbah, K.F., Winterstein, S.R., Campa, H., Furrow III, L.T., and R.B. Minnis. 1996. Effects of Conservation Reserve Program field age on avian relative abundance, diversity, and productivity. *Wilson Bulletin.*, 108:760-770.
- Negus, L.P., Davis, C.A. and Wessel, S.E. 2010. Avian Response to Mid-contract Management of Conservation Reserve Program Fields. *The American Midland Naturalist.* 164 (2):296-310.
- Kraus, H.M., Jensen, W.E., Houseman, Jameson, M.L., Reichenborn, M.M., Watson, D.F., and Kjaer, E.L. 2021. Cattle grazing in CRP grasslands during the nesting season: Effects on avian reproduction. *The Journal of Wildlife Management.* 1-26.
- Wilson, B.S., Jensen, W.E., Houseman, G.R., Jameson, M.L., Reichenborn, M.M., Watson, D.F., Mophew, A.R. and Kjaer, E.L. 2022. Cattle grazing CRP grasslands during the nesting season: effects on avian abundance and diversity. *The Journal of Wildlife Management.* 1-23.