



PSS-2610

Warm Season Perennial Forage and Hay quality result summary (2019-2024)

September 2024

Knowing the quality of forage and hay is essential for properly managing livestock. It is also a valuable tool for marketing hay for sale or identifying areas of improvement needed in hay crop management. The protein, ADF (acid detergent fiber) and NDF (neutral detergent fiber) are all affected by species, environment, nutrient management, cutting timing and baling practices. Low protein values would suggest that nitrogen (N) availability could be limited or that the crop was harvested at a mature stage. The ADF and NDF values can help deduce the reason for low protein. As described in PSS-2117, ADF values increase and NDF values decrease as the crop matures. Therefore, if your producer's have low protein and NDF values, collecting a soil sample and assessing your fertilizer strategy would be recommended. The guide E-1021 should be utilized in making fertilizer recommendations. However, if the protein is low and ADF is high, there is a reasonable probability that the forage was harvested at a very mature stage. The Oklahoma State University Soil, Water, Forage Analytical Laboratory (SWFAL) processes thousands of forage samples annually. Armed with the knowledge of the results of samples sent to SWFAL, producers can make more informed decisions on management and marketing.

The graphs below represent the range of results for samples submitted under the SWFAL crop codes 12 (Lovegrass), 13 (Bermudagrass/Warm Seasons), 25 (Native Hay), 34 (Blue Stem) and 39 (Johnson Grass). The bar is a heat graph, where red indicates poorer quality and green signifies higher quality. The values shared are the minimum and maximum (the lowest and highest values recorded during the time frame), the average of all the samples, and the percentiles of 25%, 75% and 90%. These values can help understand the distribution of the results. For example, results above the 90th percentile are better than 90% of submitted samples.

For results such as Lovegrass NDF, there is not enough data to analyze so only the minimum, maximum, and average are presented.

Key Takeaways

If the results are in the range below 25%

- The forage/hay quality has great potential to be improved.
- Look at soil fertility, weed control, harvest timing, post-harvest management.

If the results are near the average 50%

- The forage/hay quality is near the state average but has potential to be improved.
- Look at soil fertility, weed control, harvest timing, post-harvest management.

If the results are in the range above 90%

- The forage/hay quality has limited potential to be improved.
- Look at the opportunity to market hay as being of exceptional quality with potential for added value.

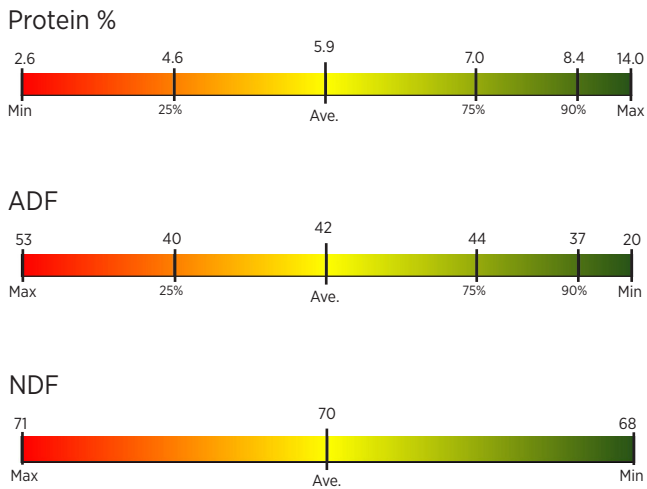


Figure 1. Distribution of the quality results of forage samples submitted to SWFAL under the crop code 12 (Lovegrass), from January 2019 to June 2024.

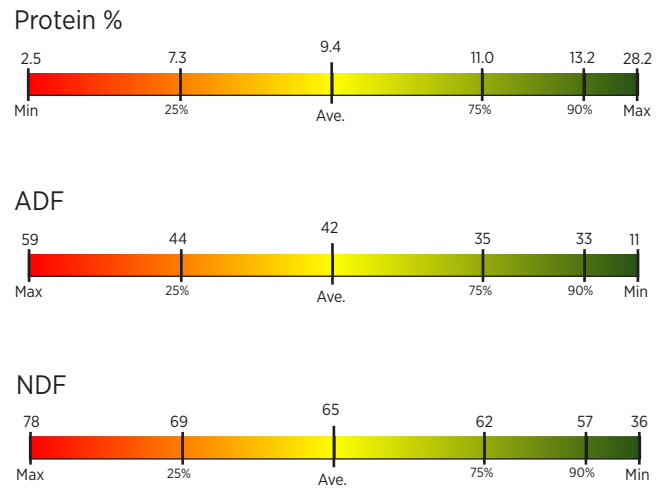


Figure 2. Distribution of the quality results of forage samples submitted to SWFAL under the crop code 13 (Bermudagrass/Warm Season), from January 2019 to June 2024. This crop code will include other species such as Teff.

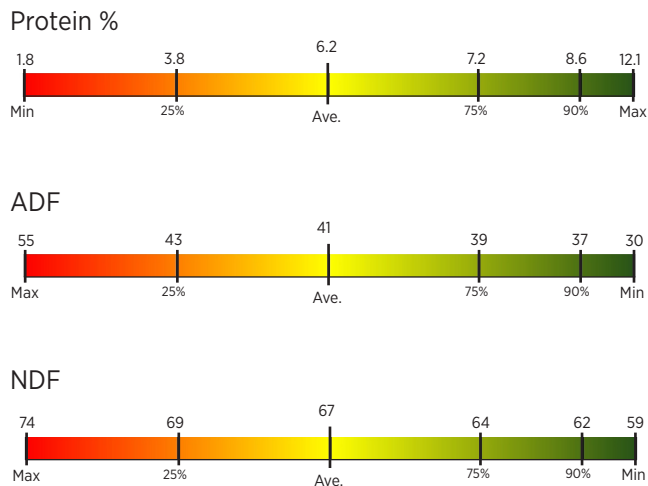


Figure 3. Distribution of the quality results of forage samples submitted to SWFAL under the crop code 25 (Native Hay), from January 2019 to June 2024.

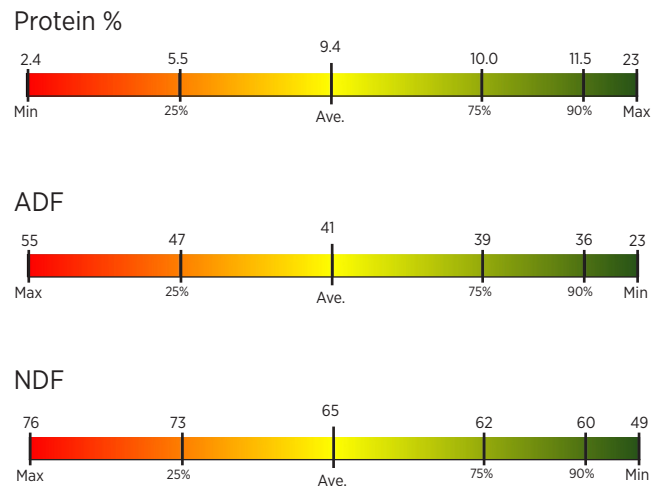
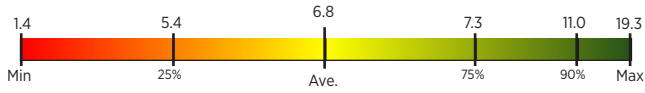


Figure 4. Distribution of the quality results of forage samples submitted to SWFAL under the crop code 34 (Blue Stem), from January 2019 to June 2024.

Protein %



ADF



NDF



Figure 5. Distribution of the quality results of forage samples submitted to SWFAL under the crop code 25 (Native Hay), from January 2019 to June 2024.

| Crop Code | 12 Lovegrass | | | 13 Bermudagrass/ Warm Season | | | 25 Native Hay | | | 34 Blue Stem | | | 39 Johnson Grass | | |
|----------------|--------------|------|------|---------------------------------|------|------|---------------|------|------|--------------|------|------|------------------|------|------|
| | Protein | ADF | NDF | Protein | ADF | NDF | Protein | ADF | NDF | Protein | ADF | NDF | Protein | ADF | NDF |
| n | 106 | 84 | 4 | 5443 | 4811 | 439 | 1286 | 1167 | 70 | 269 | 269 | 23 | 597 | 496 | 31 |
| Average | 5.9 | 41.7 | 70.4 | 9.4 | 38.7 | 63.9 | 7.1 | 41.2 | 65.2 | 6.2 | 41.3 | 66.4 | 6.8 | 41.0 | 65.3 |
| Minimum | 2.6 | 20.0 | 68.6 | 2.5 | 10.9 | 36.2 | 2.4 | 23.0 | 48.8 | 1.8 | 29.3 | 58.5 | 1.4 | 30.6 | 55.3 |
| Maximum | 14.0 | 52.7 | 71.2 | 28.2 | 58.5 | 78.3 | 23.2 | 55.2 | 76.4 | 12.1 | 55.3 | 73.8 | 19.3 | 59.0 | 76.0 |
| 95% | 10.0 | 47.1 | | 14.8 | 45.8 | 71.8 | 11.5 | 49.2 | 72.7 | 9.4 | 50.1 | 71.1 | 11.9 | 49.4 | 70.5 |
| 90% | 8.4 | 46.0 | | 13.2 | 43.9 | 69.3 | 10.0 | 46.7 | 71.2 | 8.6 | 46.5 | 70.4 | 10.7 | 46.8 | 69.1 |
| 75% | 7.0 | 44.2 | | 11.0 | 41.2 | 67.2 | 8.0 | 43.9 | 68.1 | 7.2 | 43.3 | 69.2 | 7.3 | 43.9 | 68.2 |
| 25% | 4.6 | 39.6 | | 7.3 | 35.2 | 61.7 | 5.5 | 38.5 | 62.2 | 5.0 | 38.5 | 64.2 | 5.4 | 38.1 | 63.3 |
| 10% | 3.6 | 36.9 | | 6.0 | 32.9 | 56.5 | 4.6 | 36.0 | 59.5 | 3.8 | 36.7 | 61.6 | 4.5 | 35.4 | 61.4 |
| 5% | 3.3 | 35.3 | | 5.4 | 31.3 | 51.3 | 4.0 | 34.3 | 57.2 | 3.5 | 35.8 | 60.5 | 4.0 | 33.6 | 56.5 |

Table 1. Full data of the distribution analysis of the quality results of forage samples submitted to SWFAL under the crop codes 12 (Lovegrass), 13 (Bermudagrass/Warm Seasons), 25 (Native Hay), 34 (Blue Stem), and 39 (Johnson Grass), from January 2019 to June 2024. n = the number of observations. The % (5,10, 25, 75, 90, and 95) is the value at which x% of samples fall below. For example, 95% of the Bermudagrass/Warm Season protein results were below 14.8%.

Relevant Fact Sheets

PSS-2117 Forage Quality Interpretations

PSS-2589 Collecting Forage Samples for Analysis

E-1021 Oklahoma Forage and Pasture Fertility Guide

PSS-2588 Evaluating Hay Quality Based on Sight, Smell and Feel – Hay Judging



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