

whitebarn forage quality and yield of fall baseline samples 2023

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Forage quality

forage quality estimates using near infrared spectroscopy (NIRS) Perten DA7250 with 'hay' equation in small white static plastic cup.

machine struggled to confidently predict neutral detergent fiber digestibility so I am not reporting those values nor relative forage quality.

protein, adf (acid detergent fiber) and ndf (neutral detergent fiber) expressed as percent of dry matter.

rfv.sdsu is relative feed value (RFV), no units.

Table 1: Forage quality numbers in context

Use case	protein target (%)	relative feed value target
growing or lactating cows	16	125+
maintenance/dry cows	8-12	100+

straw bale

Over a dozen cores of straw bales were sampled at white barn during fall sampling. We scanned 8 sub-samples to predict forage quality. These straw bales also had sprouting seeds when sampled.

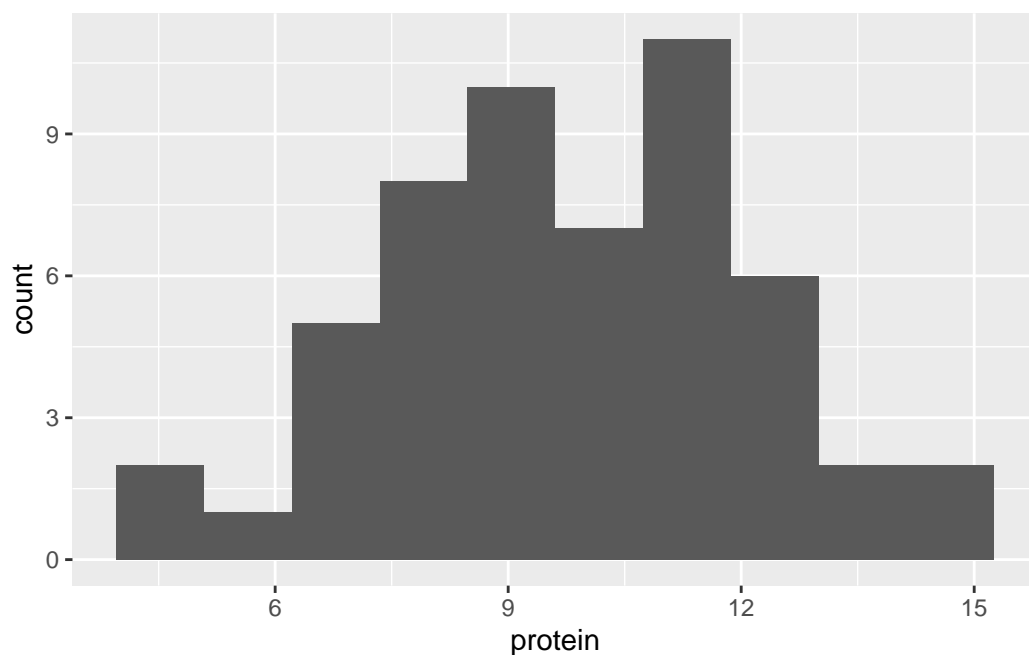
Protein averaged 5.9 %, RFV averaged 63.

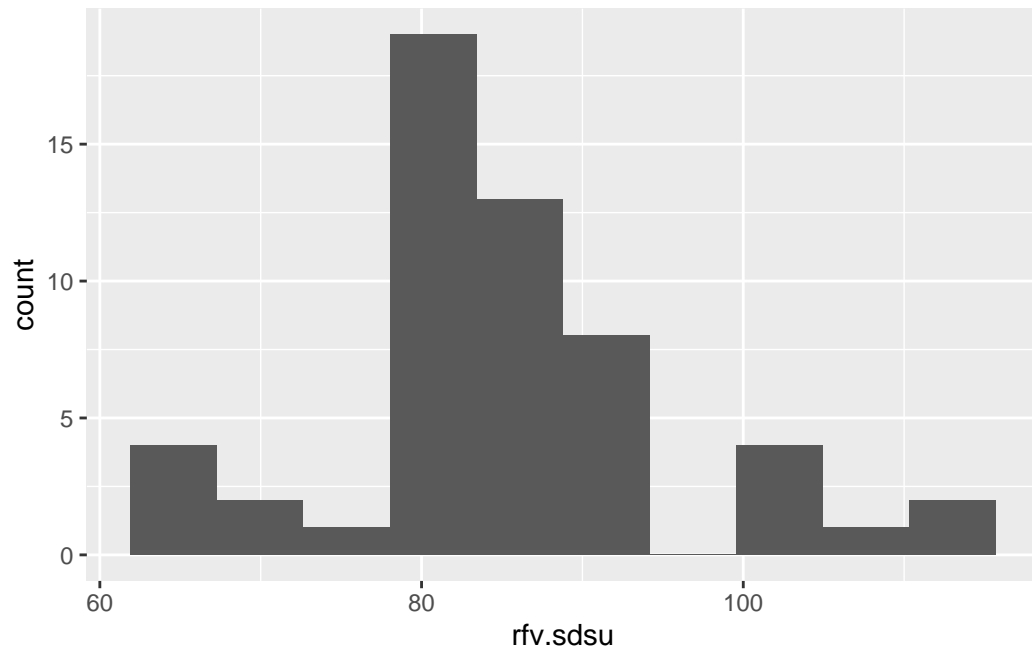
protein	adf	ndf	rfv.sdsu
Min. :5.033	Min. :40.73	Min. :78.57	Min. :61.05
1st Qu.:5.763	1st Qu.:41.68	1st Qu.:81.99	1st Qu.:61.49
Median :5.930	Median :42.16	Median :83.55	Median :62.34
Mean :5.978	Mean :42.05	Mean :83.10	Mean :62.91
3rd Qu.:6.315	3rd Qu.:42.48	3rd Qu.:84.88	3rd Qu.:63.42
Max. :6.800	Max. :43.34	Max. :86.45	Max. :66.63

baseline quadrat samples

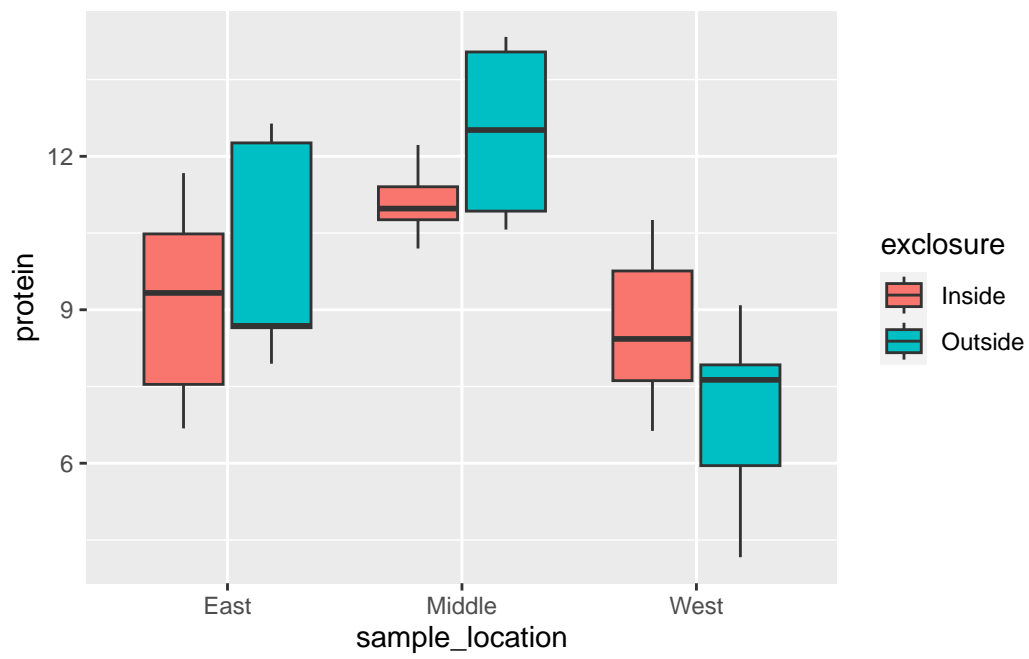
We collected fall baseline samples from 3 locations in the field. From each location, 3 samples within the enclosure and 3 samples outside. Therefore we had 3*(3+3) total samples from the field, each sample was scanned 3 times after grinding, resulting in 54 total data points for forage quality.

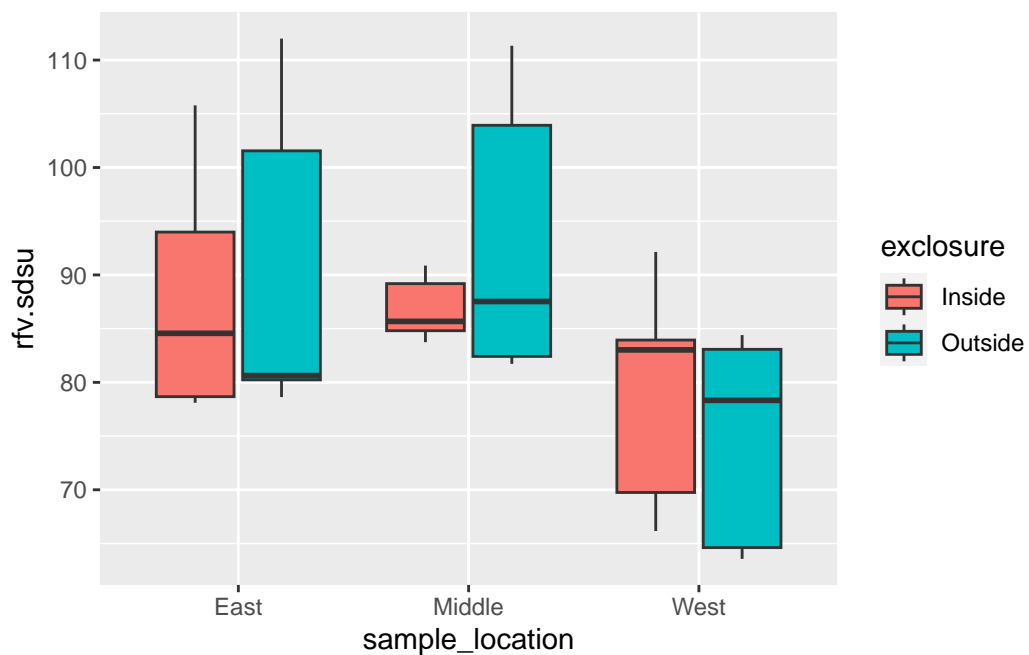
protein	adf	ndf	rfv.sdsu
Min. : 4.163	Min. :25.29	Min. :56.73	Min. : 63.57
1st Qu.: 8.046	1st Qu.:32.34	1st Qu.:66.15	1st Qu.: 80.24
Median : 9.779	Median :33.98	Median :69.25	Median : 83.73
Mean : 9.708	Mean :33.54	Mean :69.44	Mean : 84.97
3rd Qu.:11.129	3rd Qu.:35.40	3rd Qu.:71.63	3rd Qu.: 89.14
Max. :14.333	Max. :45.26	Max. :83.14	Max. :112.00





comparisons



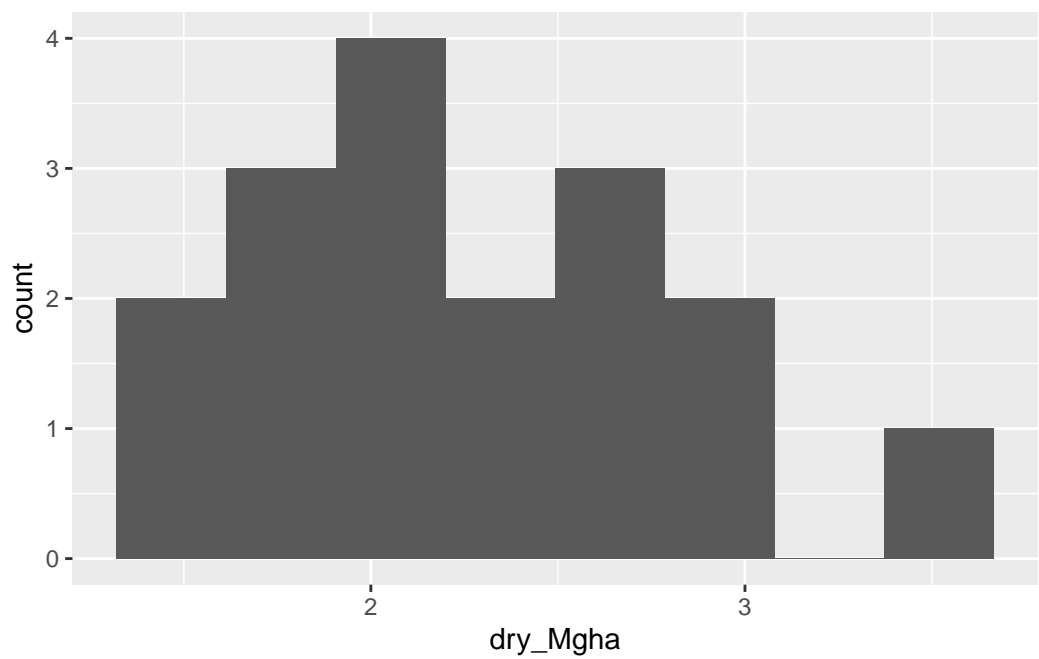
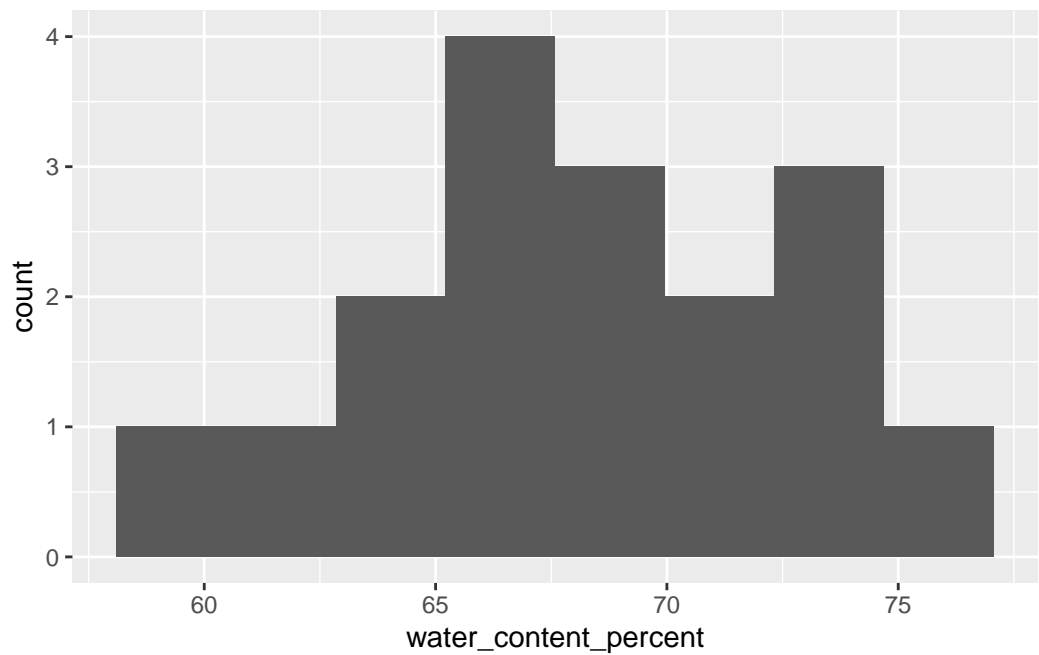


Forage yield

Estimates from 30" x 30" quadrat

Expect around 5 Mg ha dry matter yield (Hunter et al. 2020).

wet_Mgha	dry_Mgha	water_content_percent
Min. : 4.667	Min. :1.524	Min. :59.30
1st Qu.: 6.217	1st Qu.:1.869	1st Qu.:65.90
Median : 6.544	Median :2.196	Median :68.70
Mean : 7.248	Mean :2.282	Mean :68.05
3rd Qu.: 8.697	3rd Qu.:2.564	3rd Qu.:72.20
Max. :11.418	Max. :3.577	Max. :75.90



comparisons

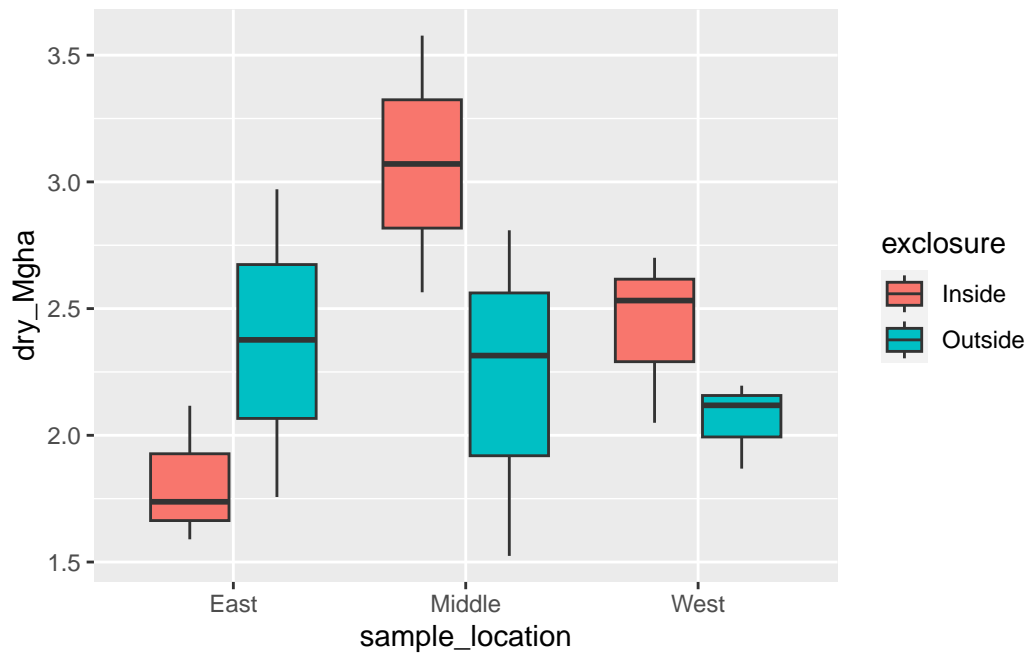


Figure 1: comparison

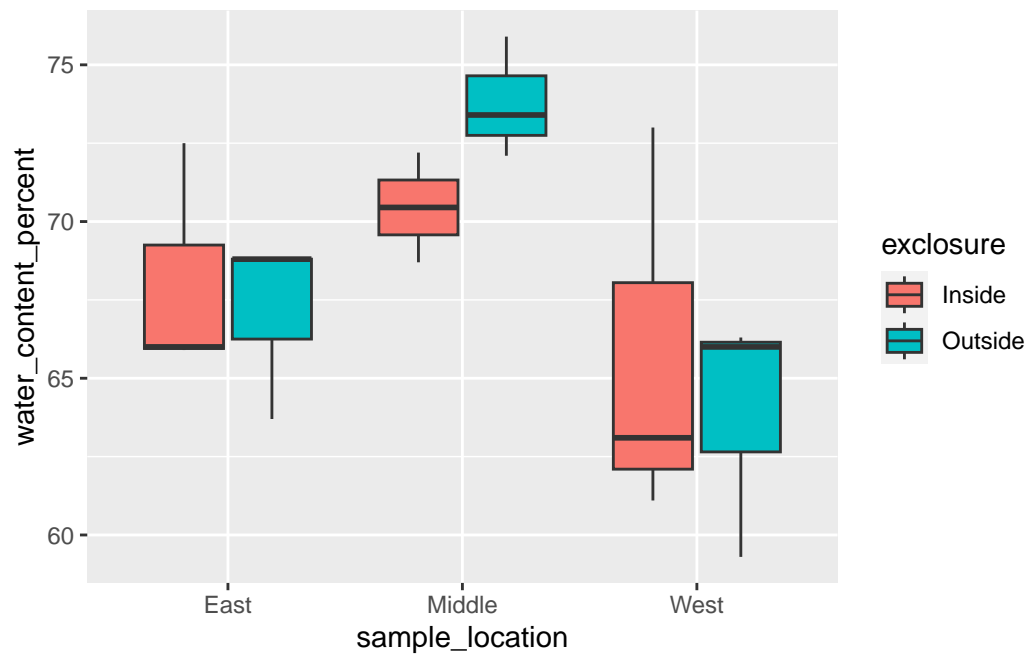


Figure 2: comparison

Discussion

These are fall baseline samples of intermediate wheatgrass.

We do not expect to see any treatment differences, but this provides valuable insight into the variability among samples and the amount of samples needed to detect differences if present (power analysis).

We expect normally distributed data for quality and yield, and we observe this. No obvious outliers.

We expect good quality forage from the fall biomass and poor quality from the summer straw. *Fall* We observe about 10% protein and an RFV of 85. This is much lower than expected, but can be fed to dry cows as maintenance feed. It's possible our predictions are incorrect, potentially overestimating the amount of non-digestible fiber in the sample. We expect the forage to be more digestible when harvested in fall (RFV ~125-150). *Summer straw* With protein at 6% and RFV at 62, this is poor quality feed as expected.

We expect a large fall forage harvest approaching 5 Mg ha as reported in Hunter et al. (2020), but we observed about 2.3 Mg ha which is surprising since forage yield seemed very high compared to other fields.

We do not expect any differences by enclosure (inside vs outside). For the most part, this held true. The middle enclosure samples were relatively higher in protein and water content than the other samples. The differences in the middle enclosure between inside and outside are interesting in figure 1 and 2, underscoring random variability in sampling.

References

Hunter, M. C., Craig C. Sheaffer, Steven W. Culman, William F. Lazarus, and J. M. Jungers. 2020. "Effects of Defoliation and Row Spacing on Intermediate Wheatgrass II: Forage Yield and Economics." *Agronomy Journal* 112: 1862–80. <https://doi.org/10.1002/agj2.20124>.