



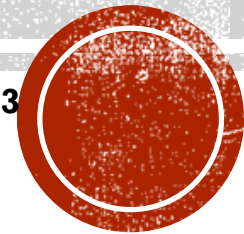
DEPARTMENT OF
PLANT AND SOIL SCIENCES
College of Agricultural Sciences and Natural Resources

REDUCED-LIGNIN ALFALFA IN WATER-LIMITED ENVIRONMENTS

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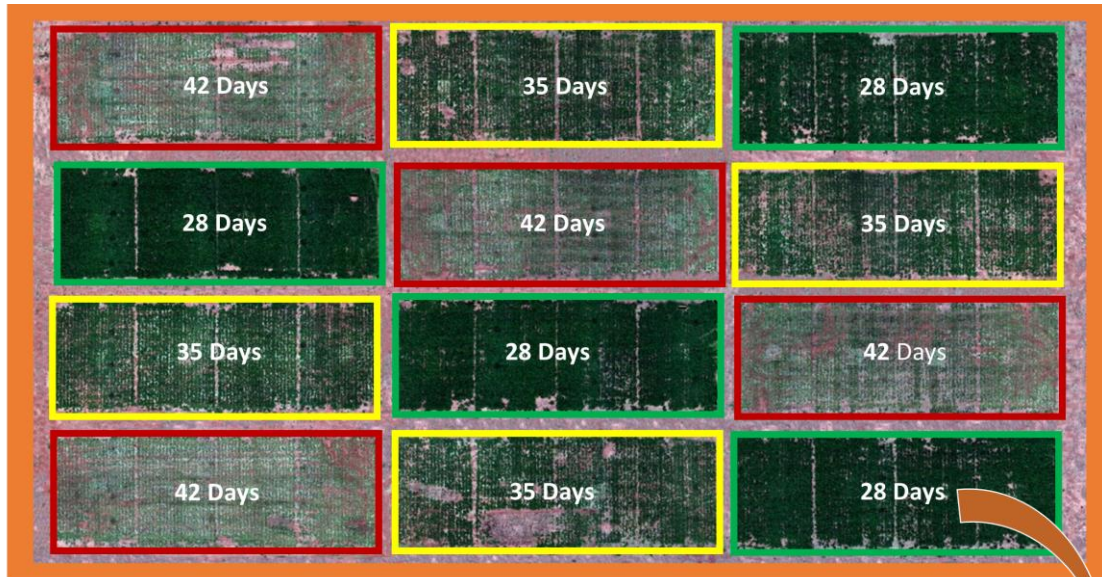
INTRODUCTION

- Alfalfa (*Medicago sativa* L.) hay production area has decreased by 16% nationwide in last ten years.
- Oklahoma's harvested area was twice reduced when compared to the national area (33.8%), from 2010 to 2019 (USDA-NASS, 2020).
- Other locations have found that reduced-lignin cultivars can increase harvest intervals, while still maintaining similar quality and quantities as that of conventional cultivars.
- The objective of this study was to evaluate the forage quality and quantity of reduced-lignin and reference alfalfa cultivars at different harvest schedules in western Oklahoma.



EXPERIMENTAL DESIGN

MAIN PLOTS



Main plots of harvest intervals can be seen in this aerial view of the research plot.



SUB PLOTS PLOTS

Alfalfa Cultivars	Cultivar Traits
54HVX41 (HVX)	Reduced Lignin, Roundup Ready
54VR10 (VR)	Roundup Ready
DKA44-16RR (DKA)	Roundup Ready
WL 356 HQ.RR (WL)	Roundup Ready

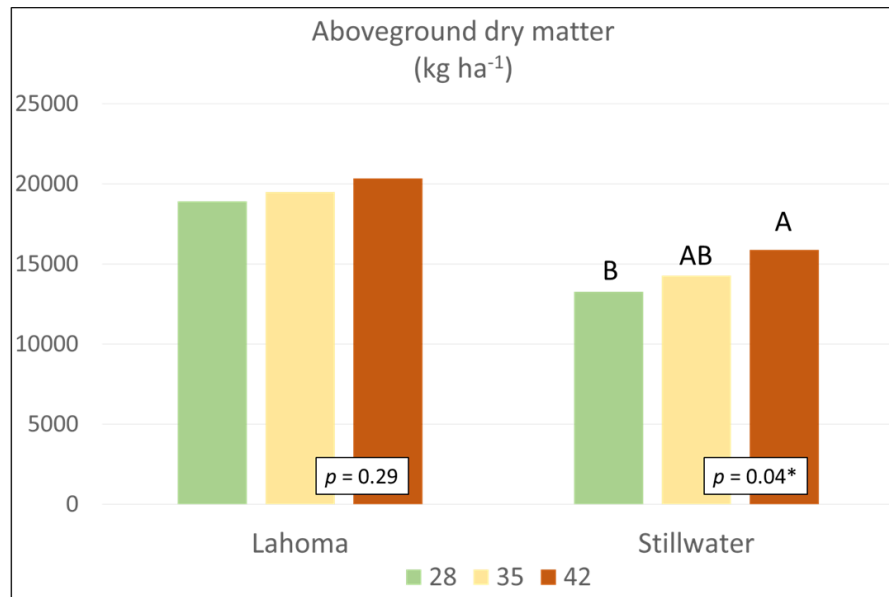
These cultivars were selected as they are the commonly used cultivars across Oklahoma and are all genetically similar.



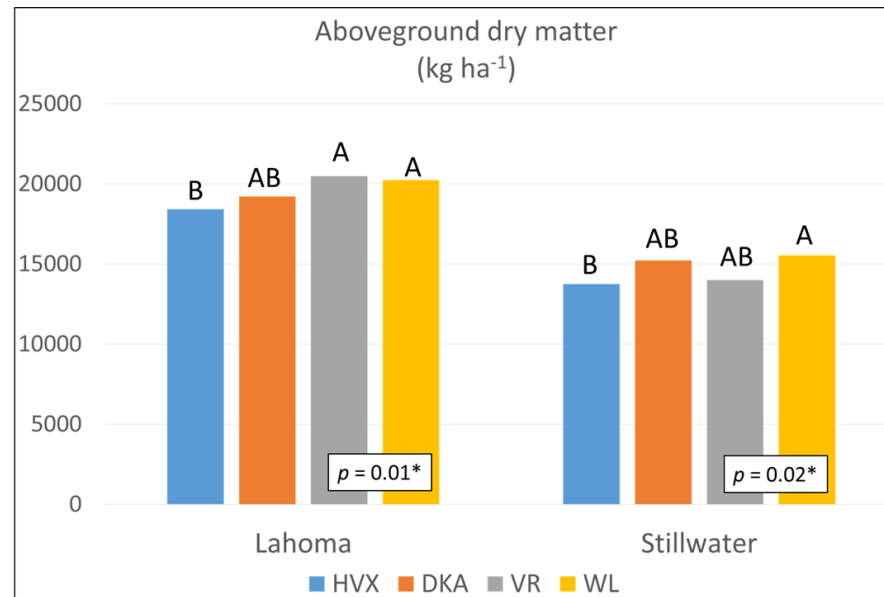
RESULTS:

Aboveground dry matter (kg ha⁻¹)

Harvest Interval



Cultivars



Letter denotes differences within a location

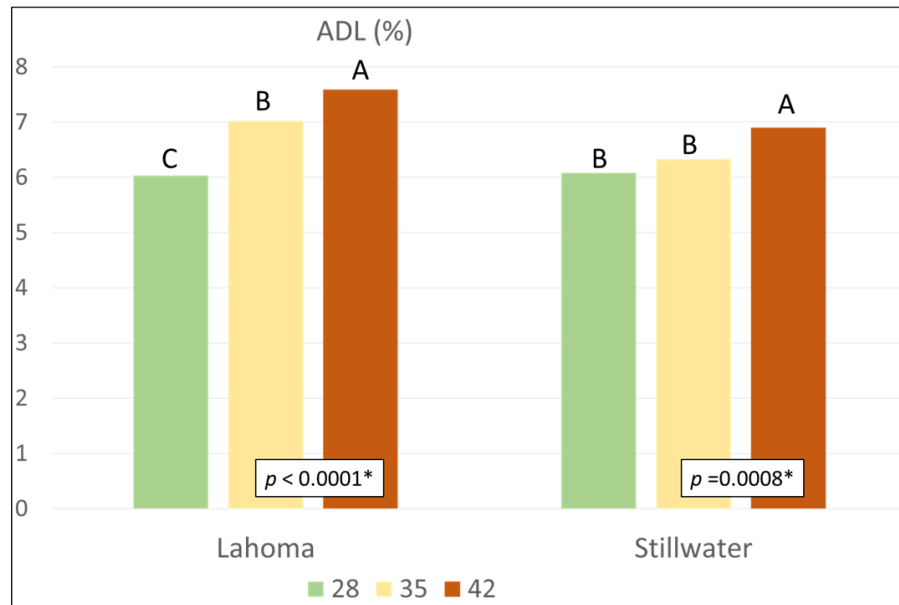
- As expected, the longer the harvest interval the greater the aboveground dry matter accumulation; however, differences were only significant at Stillwater, between 28-and 42-days harvest intervals.
- The HVX had less aboveground dry matter accumulation than VR and WL in Lahoma, and WL in Stillwater.



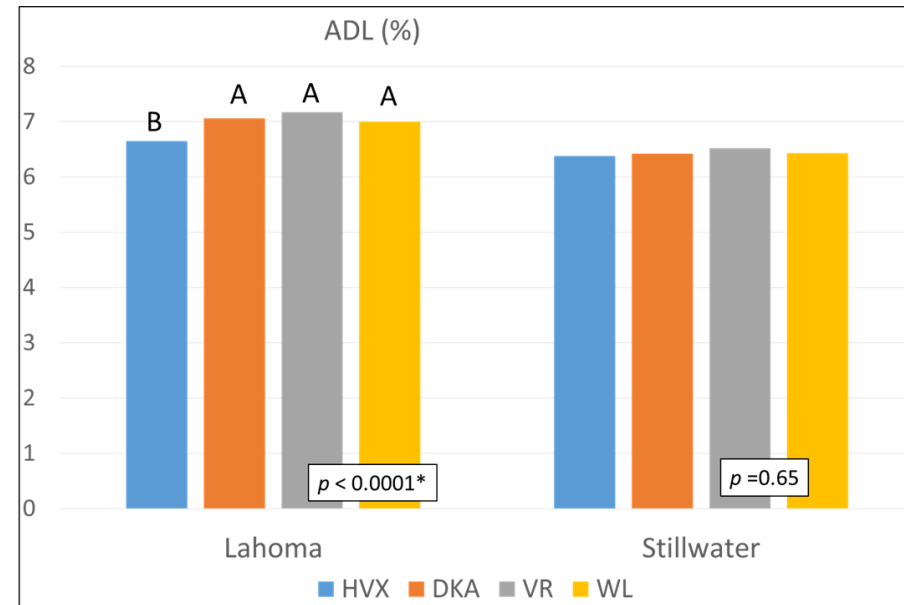
RESULTS:

Acid detergent lignin (%)

Harvest Interval



Cultivars



Letter denotes differences within a location

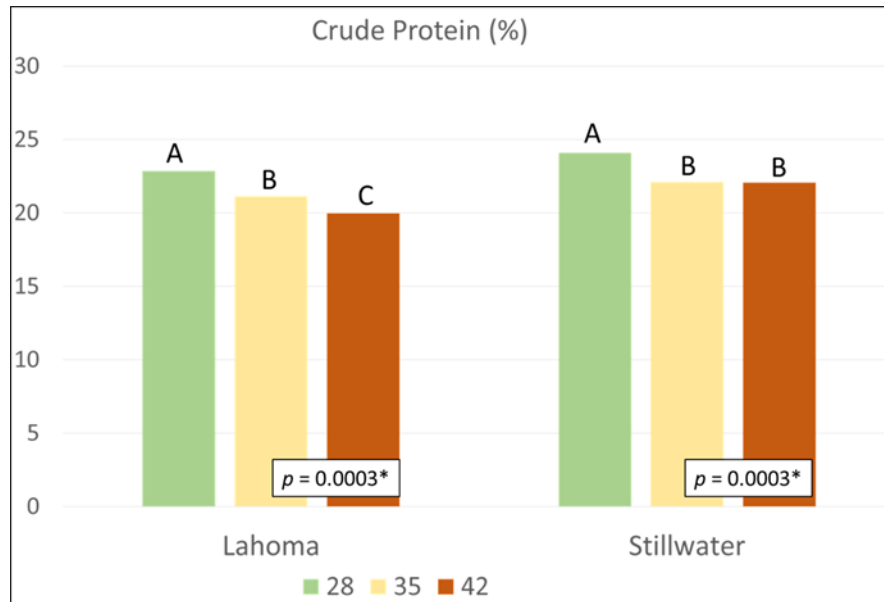
- As expected, the longer the harvest interval, the higher the lignin concentration as alfalfa plants mature
- The reduced lignin alfalfa, HVX, showed the lowest lignin concentration in both locations. However, significant differences were observed in Lahoma.



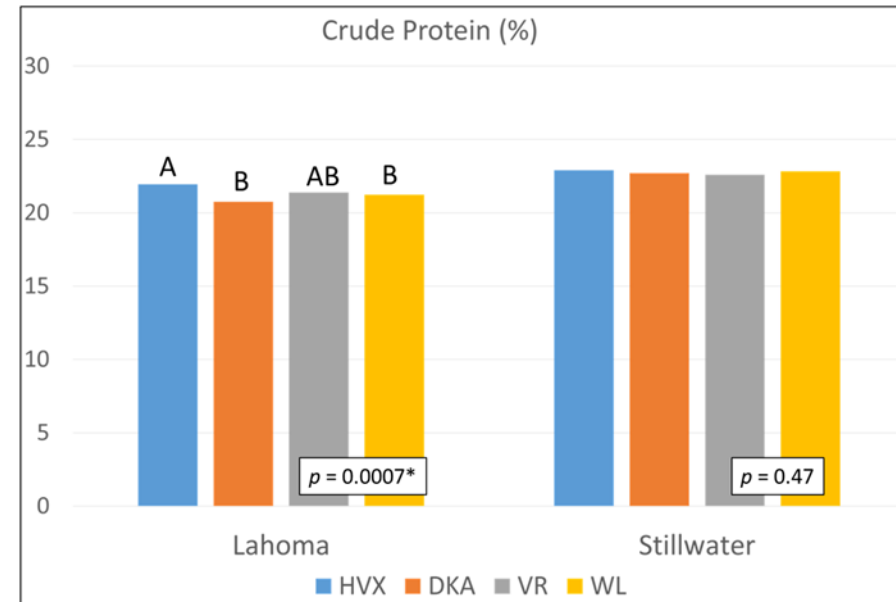
RESULTS:

Crude protein (%)

Harvest Interval



Cultivars



Letter denotes differences within a location

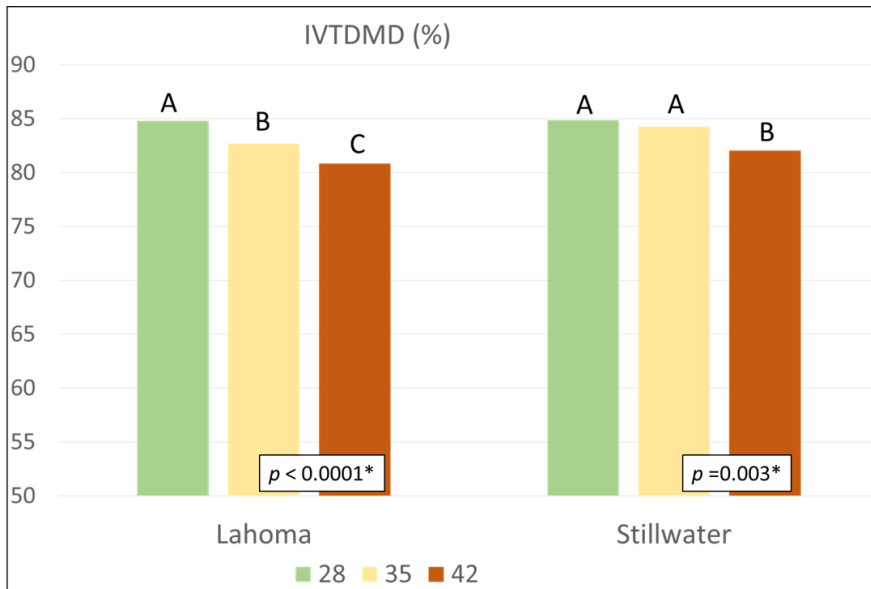
- The longer the harvest interval, the lower the CP concentration in the aboveground dry matter due to an increase in lignin content.
- The reduced lignin alfalfa, HVX, showed the highest crude protein concentration in both locations. However, significant differences were observed in Lahoma, where HVX was higher in crude protein concentration than DKA and WL.



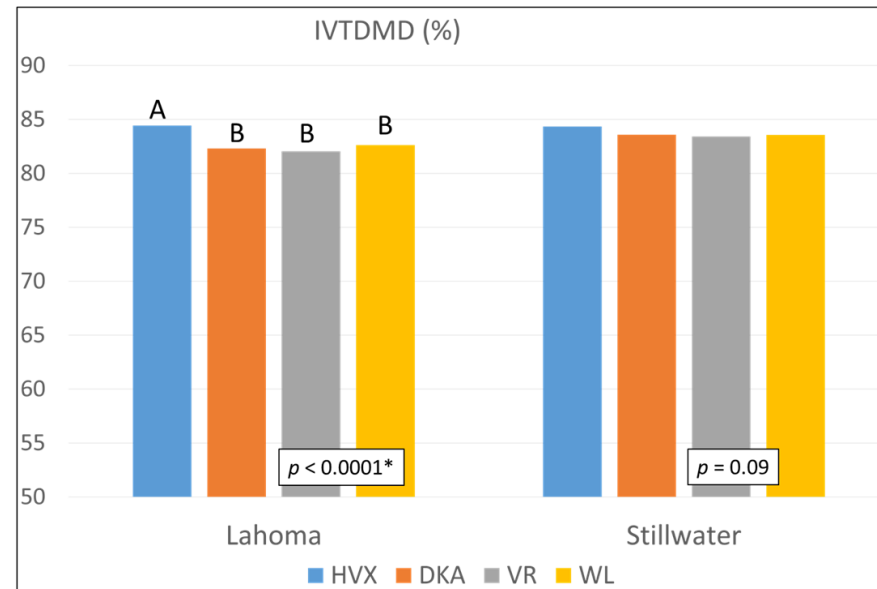
RESULTS:

In vitro dry matter digestibility 48 hours (%)

Harvest Interval



Cultivars



Letter denotes differences within a location

- The ADL concentration plays a major role in the IVTDMD concentration, where the higher the ADL concentration, the lower the IVTDMD concentration in forages. Therefore, the IVTDMD concentration for each harvest interval and cultivar was inversely related to its respective ADL concentrations.
- The reduced lignin alfalfa, HVX, was found to have 2.5% and 1% higher IVTDMD than the average of the other cultivars in Lahoma and Stillwater, respectively.



CONCLUSIONS

- ✓ Aboveground dry matter production was not different between 35- and 42-days harvest intervals, the 35-days harvest interval resulted in slightly higher forage quality.
- ✓ The reduced amount of aboveground dry matter production observed at 28-days harvest interval might be compensated by its significantly higher forage quality.
- ✓ The reduced lignin cultivar, HVX, was found to have less aboveground dry matter production than other cultivars, while maintaining higher crude protein, IVTDMD, and lower ADL.

References

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- Vough, L., and G. Marten. 1971. Influence of Soil Moisture and Ambient Temperature on Yield and Quality of Alfalfa Forage 1. *Agronomy Journal* 63(1):40-42.

