

Performance of Higher Quality Alfalfa Varieties under Different Harvest Regimes

Brenda Perez, Graduate Student, Christopher De Ben, SRA, and Dan Putnam, CE Specialist UC Davis, Kearney Research and Extension Center.

Introduction

Producing high quality alfalfa is often accomplished with early cutting but unfortunately also comes with lower yields. The question is: can we produce high yield harvests with late cuttings while maintaining quality?

As the crop matures, lignification of the stems occurs, leading to a reduction in digestibility and quality. Lignin is one of the fibrous components of the cell wall, along with cellulose and hemicellulose. Lignin, unlike the other components is indigestible to ruminant animals.

Currently, there are two types of alfalfa marketed as “higher quality” or reduced lignin types. HarvXtra® and Higest® and are possible prospects for solving the quality yield tradeoff. Our objectives were to determine the influence of harvest schedule on the yield and quality of “higher quality” alfalfa lines in comparison to conventional lines in the semi-dormant (6) and non-dormant (8 and 9) groups.

Methods:

- Planted Fall 2017, in a randomized split plot design.
- Treatments: Normal (28 d), Late (35d), and Staggered (21 followed by 35d)
- Sprinkler irrigated in accordance with evapotranspiration demands.
- Plots harvested with a flail chopper, and sub samples taken for dry matter yields and quality analysis via Near Infrared Spectroscopy and NIRS consortium equations.

| # | Name | FD | Type |
|---|-------------|----|-----------|
| 1 | H0615T514 | 6 | HarvXtra® |
| 2 | RRAIf 6R200 | 6 | Control |
| 3 | RRL913T4 | 8 | HarvXtra® |
| 4 | DKA84-10RR | 8 | Crontrol |
| 5 | HiGest660 | 6 | Higest® |
| 6 | SW6330 | 6 | Control |
| 7 | AFX960 | 9 | Higest® |
| 8 | SW9720 | 9 | Control |

Yield Data

A. Table 2: Effect of Variety on Yield (averaged across reps and cutting schedules)

| Semi Dormant | Var # | FD | Type | 2018 (t/A) | 2019 (t/A) (partial) |
|--------------------|-------|----|-----------|------------|----------------------|
| RRAIf6R200 | 2 | 6 | Conv | 10.25 a | 7.64 |
| H0615T514 | 1 | 6 | HarvXtra® | 9.92 | 7.30 |
| SW6330 | 6 | 6 | Conv | 9.71 | 7.04 |
| HiGest660 | 5 | 6 | Higest® | 9.61 | 7.19 |
| Non Dormant | | | | | |
| DKA84-10RR | 4 | 8 | Conv | 10.11 | 7.43 |
| RRL913T4 | 3 | 8 | HarvXtra® | 9.58 | 6.68 |
| SW9720 | 8 | 9 | Conv | 9.30 b | 6.81 |
| AFX960 | 7 | 9 | Higest® | 10.20 | 7.27 |
| LSD | | | | 0.76 | 0.69 |

In 2018, there was a trend for the higher quality alfalfa types to have lower yields compared with their respective conventional check lines however, this difference is not significant.

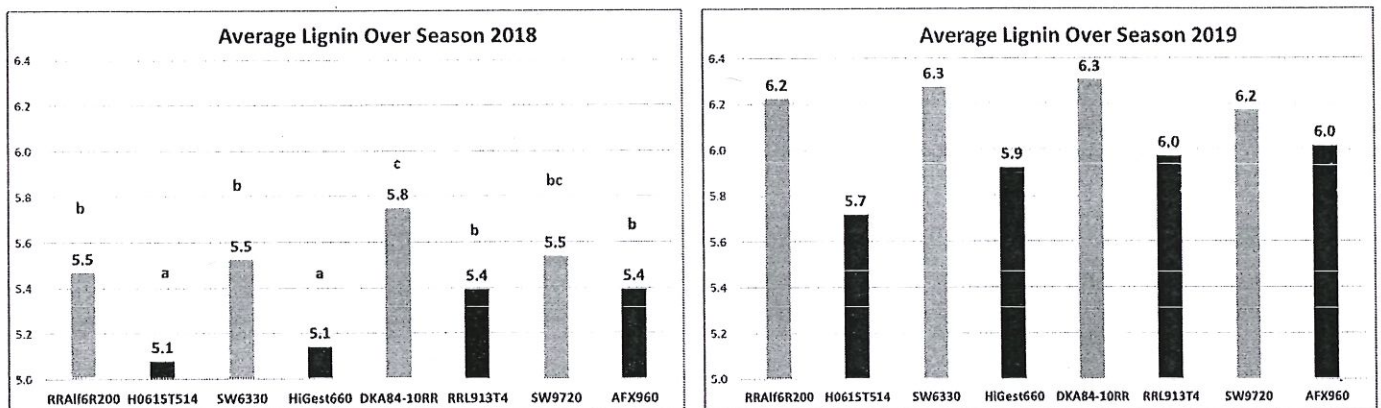
B. Table 3: Effect of CS on Yield (averaged across reps and varieties)

| | 2018 | | | 2019 | | |
|-----------|-----------|--------|------|-----------|--------|------|
| | Staggered | Normal | Late | Staggered | Normal | Late |
| Mean | 9.6 | 9.3 | 10.6 | 7.2 | 6.8 | 7.5 |
| # of Cuts | 8 | 8 | 7 | 4 | 4 | 3 |
| LSD | 0.4 | | | 0.41 | | |

The largest yields were produced by the late (35 d) cutting schedule, averaged across varieties. The staggered treatment yielded slightly higher than the normal treatment but this difference was not significant.

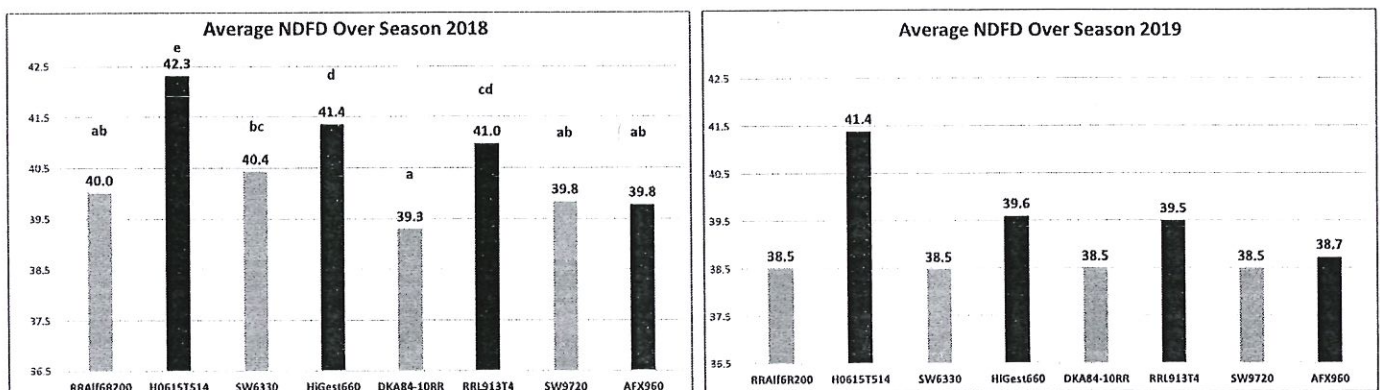
Quality Data

A. Figure 1: Effect of Variety on Lignin



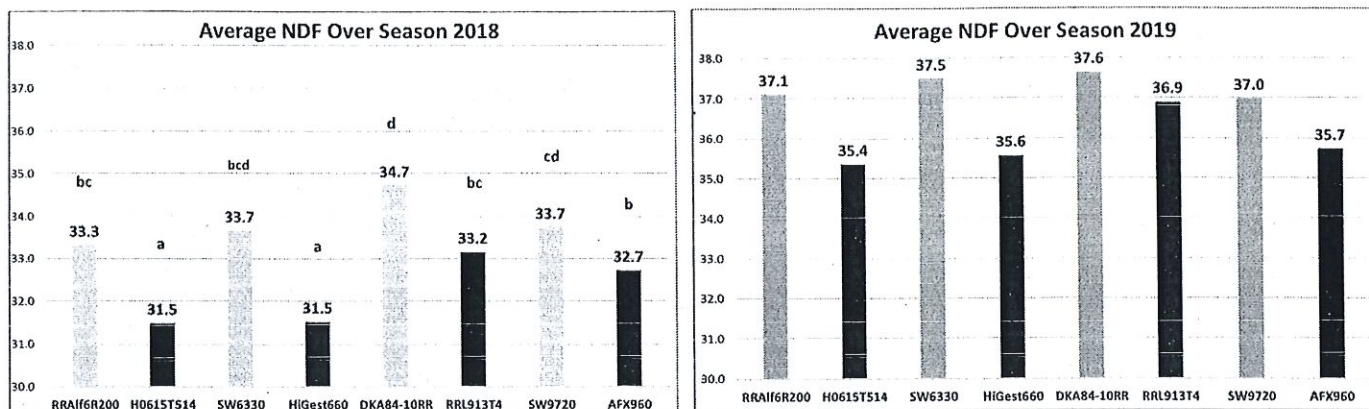
In 2018, averaged across reps and cutting schedules, H0615T514, HiGest660, and RRL913T4 had significant lower levels of lignin than their conventional counterparts did. The trend seemed to continue for the 2019 growing season.

B. Figure 2: Effect of Variety on NDFD



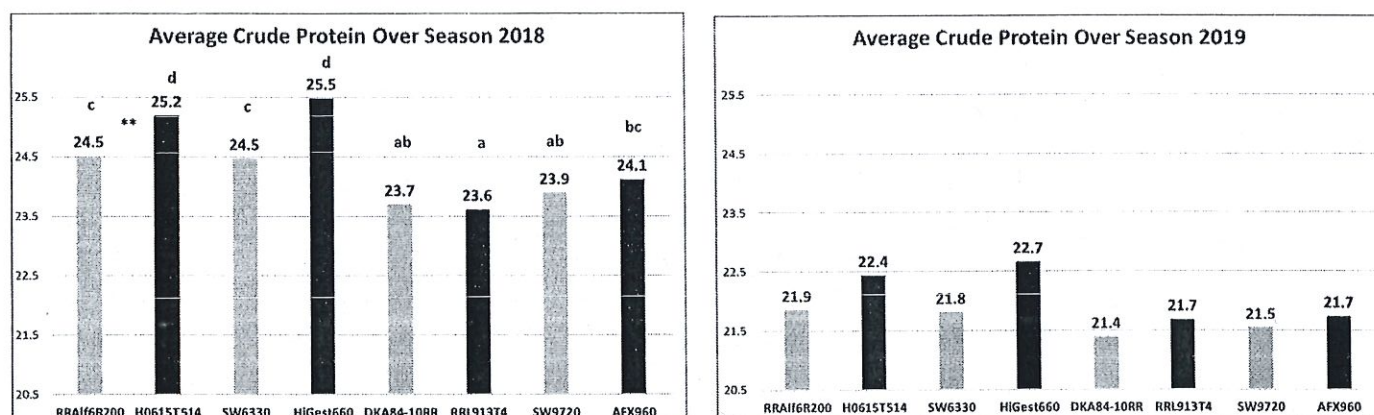
In 2018, averaged across reps and cutting schedules, all higher quality types of alfalfa except AFX960, had significantly higher Neutral Detergent Fiber Digestibility (NDFD30). A similar trend is noticeable in the 2019 growing season.

C. Figure 3: Effect of Variety on NDF



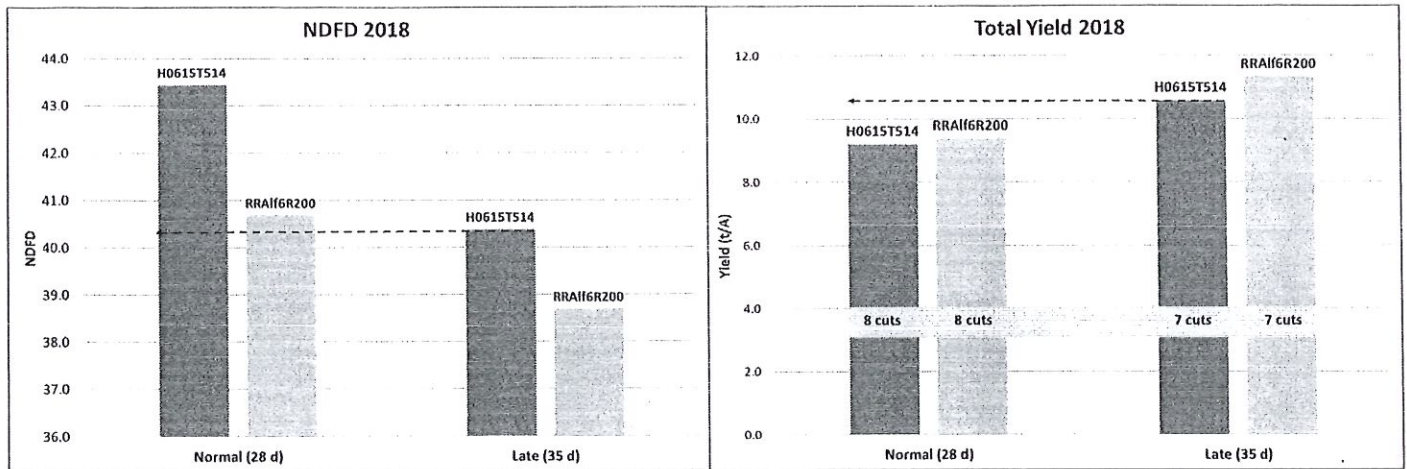
In 2018, averaged across reps and cutting schedules, all higher quality alfalfa types had significant lower NDF levels than their check varieties. The trend seemed to continue in the 2019 growing season.

D. Figure 4: Effect of Variety on CP



In 2018, averaged across reps and cutting schedules, only the semi-dormant higher quality alfalfa types had significantly higher crude protein than their respective conventional check varieties. In 2019, a similar trend is demonstrated.

E. Figure 5: Effect of Cutting Schedule and Variety on Yield and Quality (average of all 2018 cuts).



The key concept behind these higher quality alfalfas is their potential to allow for the production of higher yields without a penalty in quality. The figure demonstrates this general principle for the semi-dormant (6) HarvXtra alfalfa, H0615T514.

Preliminary Conclusions:

- Although there is a slight trend towards the highly digestible alfalfa types to have lower yields than conventional types, this difference is not statistically significant.
 - This result is consistent with results found by:
 - Grev et al., 2017, Hay and Forage Grower Aug/Sept 2019
 - But contrary to what was found by
 - Arnold et al., 2019 (Multistate Trial)
- Highly digestible alfalfa types (except AFX960) demonstrated higher NDFD30 levels compared to conventional alfalfa.
 - This result is consistent with results found by
 - Arnold et al., 2019, Grev 2017, and Hay and Forage Grower Aug/Set 2019