



## Comparing Enhanced-Quality Alfalfas by Daniel Olson and Larry Hawkins, PAS

If you're a dairy farmer and you haven't heard of low-lignin alfalfa, you almost had to be hiding under a rock. Two alfalfa-breeding companies with very deep pockets have worked hard to bring low-lignin alfalfa to the attention of the producer community. Low-lignin isn't the magic solution to great alfalfa, but let's first address the facts at hand.

The major effort in this alfalfa war is a genetically engineered alfalfa that stacks the low-lignin trait on top of its Roundup Ready® trait. The genetic engineering causes the alfalfa plant to "down regulate" the production of lignin to about 10 percent to 15 percent less than would be normally expected. This alfalfa retails for about \$600 a bag!

The second effort is a naturally bred alfalfa plant that's selected for lower lignin from the general population of alfalfa plants. This alfalfa promises 8 percent to 10 percent less lignin.

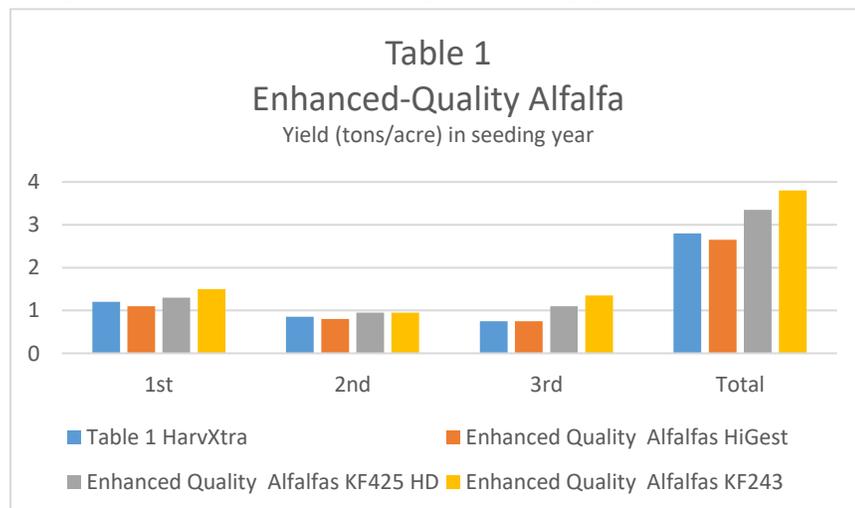
A third alfalfa-breeding effort—which has been ongoing for over 15 years—focuses on breeding directly for higher digestibility. In this article, we take a look at how the three programs compare on a modern dairy farm in Wisconsin. We'll refer to all three programs as "enhanced-quality" alfalfas.

### A Case Study in Wisconsin

Four alfalfas were planted in 30-foot-wide plots (simply because this was the width of the farm's mower).

These plots were replicated and when harvested were merged. The chopper went down the field with one variety and came back on the same variety. The loads

were then weighed on the farm's scale and sampled for quality.





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The four alfalfas were HarvXtra®, the *GMO* alfalfa; HiGest 360®, the naturally bred low-lignin alfalfa; KingFisher® 425HD, the alfalfa naturally bred directly for higher digestibility; and KF243, as a control. Our goal was to see if KF 425HD deserved to rank with the new low-lignin varieties in our new category of Enhanced Quality alfalfa.

Table 1 shows the yield results from the seeding year. KF 425HD led the low-lignin alfalfas by over 0.5 ton/acre on a dry matter (DM) basis.

Table 2 compares the lignin values of the four alfalfas. The first three alfalfas were considerably lower in lignin than the control. The rankings were HarvXtra, 6.2 percent lignin; KF 425HD, 6.4 percent lignin; and HiGest 360, 6.5 percent lignin.

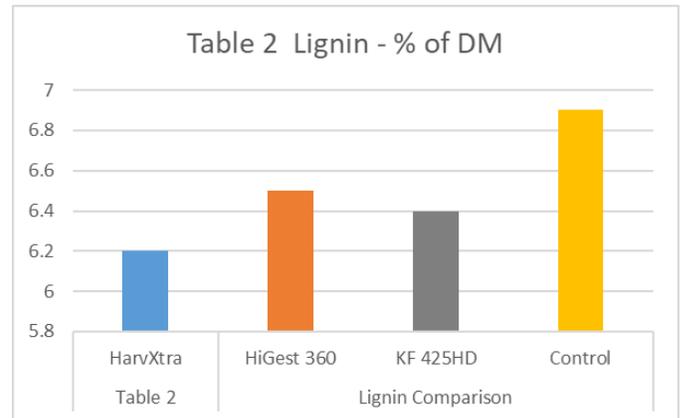
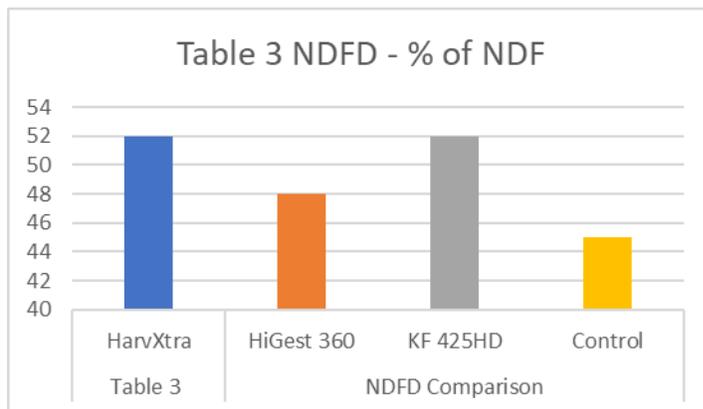


Table 3 shows the all-important NDFD rankings. HarvXtra and KF 425HD both have a NDFD of 52, followed by the HiGest 360 with a NDFD of 48, and the control at 45. This is the most important quality of any forage



because digestibility determines how much energy a cow can derive from eating the forage. Note that total population of alfalfas average between 40 percent and 45 percent NDFD.

One of the best things about our HD alfalfas (KF 425HD and KF 426HD) is that you can buy them for the same price as any typical alfalfa. The cost of the seed for the *GMO* low-lignin variety more than twice as high (\$12/lb.)!

You could stop reading here, but for a greater understanding of the low-lignin effort, read on.

### More About Lignin



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The popular term for these new (HarvXtra and HiGest) alfalfas is, again, *low-lignin*. This reminds me of many political arguments that are called “straw man”—an intentionally misrepresented proposition that is set up because it is easier to defeat than an opponent’s real argument. Low-lignin, of course, is the straw man.

Today, *lignin* is used little in modern dairy nutrition. The new terminology that has replaced it is uNDF, or undigested neutral detergent fiber. Why the new term? Very simply, lignin does a poor job of representing what is truly undigested in a forage.

### It’s All About Cross-Linkages

Lignin itself is definitely not digestible; however, all lignin is not the same. Lignin is not the same in all alfalfas or in all corn silages. The differences in each forage are due to the number of cross-linkages that are formed between the lignin and the other parts of the NDF, especially the normally very digestible hemicellulose. This cross-linking renders the hemicellulose less digestible or not digestible at all. Therefore, knowing only the lignin percentage is not a viable way to determine what part of the forage is not digestible or, on the other side, what part is potentially digestible (pdNDFD).

Our alfalfa breeders—instead of accepting the straw man argument—have searched for more than 15 years to identify alfalfas that are naturally very digestible regardless of whether their lignin is low. This really means that they’re looking for viable alfalfas that have less cross-linking—allowing the cow to digest more of the alfalfa’s NDF.

The truth is that the “low-lignin” competitors, HarvXtra and HiGest, are lowering lignin less than one standard deviation lower than the natural population of all alfalfas. So some alfalfas in the natural population are more digestible than either HiGest or HarvXtra. Of course, there are many more alfalfas that are much less digestible. Our alfalfa breeders’ quest is to identify alfalfas in the very high digestibility status that are also viable for commercial forage production. Has it worked? At the 2016 Forage Analysis Superbowl, the best alfalfa (with an NDFD of 70.2 percent) wasn’t HarvXtra or HiGest. Instead, it was an HD alfalfa bred especially for higher digestibility! I’d certainly call that enhanced.



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