Sorghums from a Nutritionist's Point of View by Larry Hawkins, PAS

With the advent of BMR Gene 6 hybrids, Alta have moved sorghums from the "just heifer" feed category to the top of the "dairy" quality feed category (and made it even better heifer feed!). With the decreased lignin and increased digestibility, Alta BMR Gene 6 now competes with corn silage in both yield (in many geographical locations) and energy. In warmer climates, such as the lower half of Byron's trade area (KY, TN & MO plus southern IN, OH and IL), sorghums compete with corn silage head to head in yield. In the cooler Upper Midwest (South Dakota, Minnesota, Wisconsin and Michigan), the combination of the sorghum and the winter crop (Trical® 336 or 815) provides very competitive DM yields to straight corn silage. These yields come with added benefit of all the advantages of using a cover crop. This includes having roots growing in your soil virtually all year around, improvements in organic matter and soil structure plus much more. Other advantages of a sorghum rotation include their ability to produce a ton of silage with half the rain or irrigation as corn plus their ability to thrive in hot weather. In the upper Midwest, this can also be their downfall, i.e., if the summers are cool and wet, sorghums will underperform.

When feeding sorghums for the first time, you will notice a very high palatability due to the high sugar levels. Cows will love it and prefer it to almost any other forage. Sorghum-Sudan (SS) which is cut several times during the growing season and are never allowed to head, will have from 10 to 16% CP depending fertility and relative maturity. Sudan Hybrids (SH), also a multi-cut forage will produce CP's 4 to 5 percentage units higher than SS. Forage Sorghums (FS) can be 10% CP, 10% Starch (they should be harvested at soft dough stage) and 10% sugar. These protein levels become significant when you consider that sorghums are equal or higher in energy than corn silage with the extra protein!

The nutritional side of sorghums requires some understanding as the plants will produce both high NDF and high 5- and 6-Carbon sugar. A nutritionist, who looks at a typical sorghum feed test, often will be put off by the NDF levels. The main problem is that the energy value (not a test, but a calculation) will appear to be very low. There are at least two culprits. First is the high NDF value, and second is the fact that, as of yet, forage testing labs have small numbers of sorghum samples and an even smaller number of BMR Gene 6 samples, plus rarely are the two sorghum types properly labeled. The result is that NIR values for NDF-d are suspect (read "low"). This makes for a lower than accurate appraisal of the real energy value for the BMR Gene 6 silage or hay.

What is the solution? Rick Grant at the Miner Institute in Chazy, NY says that the real energy value of sorghum products can be arrived at by adding 0.10 to 0.15 units to the NE_L calculated on the feed test. This would mean that the calculated value, 0.64 NE_L, e.g., would actually be from 0.76 to 0.79. These adjusted energy levels would now make the proper ration. So the question now becomes should the addition be 0.10 or 0.15 or somewhere in between? The solution is found by looking at the ADF. ADF is directly related to maturity at cutting. If the ADF is anywhere from 28 to 35, the proper NE_L addition is 0.15. If the ADF is higher, use 0.10 or 0.12. Obviously, after a few trials, your nutritionist will gain confidence in these adjustments.

We are looking for a time when feed testing labs and sorghum companies will have invested enough effort (in vitro or in situ testing) to gain more accurate numbers for sorghum energy and digestibility to establish the difference between older BMR types and Gene 6. Until that time the aforementioned adjustment methods will get you very close to the proper diet. Our wish for accurate sorghum assays will probably not happen until labs unify their methods for such things as sugar, NDF-d, in haylage and corn silage plus starch availability in corn silage so that testing results will be more comparable from one lab to another. Obviously, it surely won't happen until sorghums become as popular on dairies as they deserve to be given their yield and feeding characteristics.

The last caveat for sorghum is their chance to contain either 1) Nitrate (NO_3) or 2) Prussic acid (PA). In regards to Nitrate, fertilizer needs for sorghums are from 1 to 1 ¼ pounds of N per growing day. This means for SS and SH, the first harvest is in 45 days and any subsequent harvest is in 30 days. These crops should be fertilized accordingly. The first application can be manure (which will not all be available for the cut); however. it is better to use urea or ammonium sulfate for the subsequent applications using best guess for how much N will be left from the manure (rain, etc.). For the forage sorghums, the same rate of N will be needed (1 to 1¼#'s per growing day), but now you must calculate for the growing season which is from 85 to 116 days depending on the relative maturity of the FS that you choose. The exciting thing for the Upper Midwest is that now there are forage sorghums as short as 85 days! Following these recommendations for N, will almost certainly remove most of danger of NO_3. The only warning is to watch when harvesting sorghum shortly after a drought has broken. The rain causes a sudden uptake of NO_3 which cannot be converted in to protein quickly enough.

Fermenting the sorghum will detoxify approximately ½ of the NO_3.

Prussic acid is formed in any sorghum plant after a freeze. Harvesting the sorghum and allowing it to ferment will dissipate <u>all</u> of the PA. If you are grazing, a more careful process should be followed. If the frost was a complete killing frost, allowing the cows back into the sorghum pasture after 5 days will be safe. If it was a light frost, more Prussic acid will be formed at the next frost until the plant is no longer vegetative. It is obviously wise to avoid night grazing during potential frost events. One way to test the absence of PA is to send a cow that kicks into the pasture and if she is still upright in the morning, the crop is OK! If she isn't she was a kicker anyway. (Just kidding!). However, Prussic acid poisoning is very rare since the causative factors have become very well understood.