



Rain Impacts Forage Quality

By John McGregor, MFGA Extension Support

The MFGA article [First Cutting Can Make or Break a Season](#) looked at how the stage of maturity at first cut is one of the most important factors influencing forage quality.

The trade-off between yield and quality as forage matures generally affect the leaf-to-stem ratio decline which leads to increased concentrations of fiber components and reduced protein and energy content.

Neutral detergent fiber (NDF) represents cell wall components of forages, including cellulose, hemicellulose and lignin. While hemicellulose and cellulose can be digested to some extent by bacteria in the cow's rumen, lignin is indigestible. Lignin also will reduce digestibility of cellulose and hemicellulose. Therefore, increased NDF content reduces overall fiber digestion by rumen microbes, reducing the energy value of the forage.

The NDF content is also related to the "bulk" of forages and high NDF can reduce the amount of forage that a cow can eat physically. Limited intake of low-quality forages may result in performance losses.

In Manitoba, the majority of our perennial forage species harvested for hay are cool-season species. Cool season grasses initiate growth early in the spring and reach peak production in mid June to early July. Management (timing) of first cut is dependent on the stand's forage mix and the quality requirements of the forage.

Heading into the beginning of haying season, above-normal precipitation or untimely rains can lead to harvest delays. These delays for many types of forage may cause them to become over-mature by the time they are harvested.

Temperature is also a major factor in how plants mature. Warm temperatures lower forage quality compared with forages grown under cool temperatures even when forages are harvested at the same maturity stage. The combination of relatively cooler temperatures and continued rain well into the growing season has kept many types of forage in a vegetative state, which could mean that forage quality may not be reduced as much as expected.

Rain can't only delay cutting but rainfall that occurs between cutting and baling can have a variety of impacts on forage quality.

Yield and digestibility losses between 6 and 40 percent have been reported, depending on factors such as species, timing and amount of rain, stage of maturity at harvest and drying conditions.

Leaching of plant sugars (carbohydrates), vitamins and minerals out of plant tissues is a major concern. Crude protein content may be increased in rained-on hay because it composes a larger portion of forage dry matter as sugars are lost.

If hay is baled while it is too wet, much of the crude protein may be lost to heat damage and high moisture content of forages can cause continued respiration in harvested forage, further contributing to carbohydrate losses. Leaf shatter and loss can occur, particularly with alfalfa.

In addition, the potential for increased microbial activity can reduce forage quality and increase the risk of mold and mycotoxins.

Recommended dry matter percentages for baled hay are approximately 18 percent or less for large round bales, 16 percent or less for large square bales and 20 percent or less for small square bales.

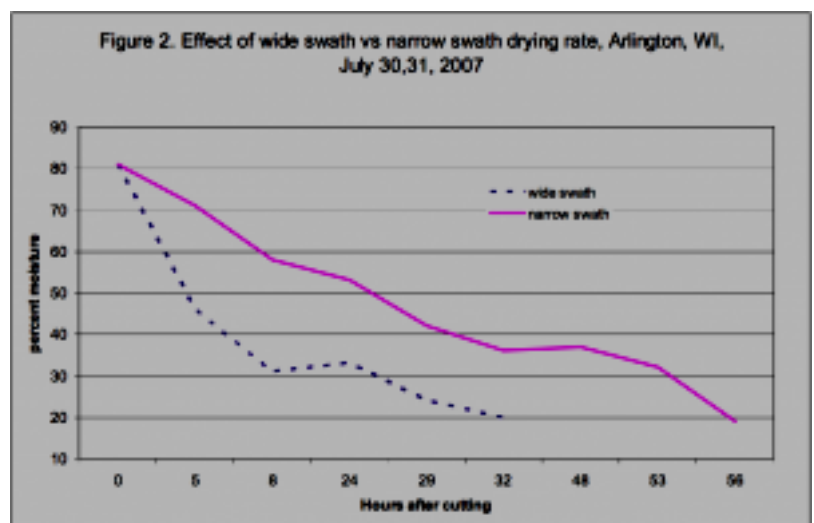
Spontaneous combustion may occur when internal temperatures exceed 65 C. Most of the time, this will occur within a few weeks of baling, but it also can occur with heavy rainfall after hay is in the stack.

Quality losses due to heating may occur as well. Some proteins may bind with fiber, which makes them unavailable for digestion. The presence of mold and mycotoxins also can be detrimental to livestock.

If you are facing the possibility of having cut hay rained on, there are a few practices that you can consider.

Alfalfa can be more impacted by rainfall than grass forages, especially if leaves are shattered or dropped from extra windrow raking or turning. If there is a window of opportunity cutting and getting the alfalfa into storage early can help preserve quality but affect total yield.

Quality losses are minimal if the rain occurs soon after plants are cut off before the curing (drying) process begins. This graph shows how quickly hay can start to dry down and provides an idea as to how much time you have between cutting and curing before rain can start to affect quality. The other takeaway is how quickly hay can dry down when swathes are spread out to intercept sunlight.



Heavy (one inch-plus) rains typically leach 10 percent of the soluble sugar nutrients out of the hay and losses can increase to over 30 percent if multiple rain events occur during curing. Typically, losses are from 5-15 percent with each additional rain.

To minimize rain damage, producers should focus on limiting field exposure time after the forage is cut. Practices such as spreading windrows as wide as possible, chemical or mechanical conditioning, and timely raking can speed forage dry-down from two days to one-half day.

Another effective strategy is harvesting at higher moisture content. Chopping alfalfa for silage or bale wrapping high moisture bales are ways to limit weather risks. All silage harvesting methods can move alfalfa off fields in two days or less.

Finally, given the large list of variables that can impact forage quality in a wet year, forage analysis is extremely critical.