



Assessing and managing forage after Mother Nature throws a

SUMMER SNIT

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Living in Wyoming often means dealing with severe weather.

This includes hail storms and their associated damage to cars, buildings, gardens, and crops.

There are important considerations when faced with hail-damaged forage, both to help maintain a healthy crop and to ensure the safety of the forage for feeding livestock.

Tips for assessing damage to forage crops

Alfalfa

Timing, the extent of defoliation, and damage to growing points on plants are important factors in determining your course of action. Research from the University of Wisconsin Marshfield Research Agricultural Station suggests alfalfa yield losses due to hail damage on first cutting will be approximately 35 pounds per acre for each percent of defoliation occurring within two weeks of harvest. Later in the season, hail damage losses are typically

less. Forage quality is also lost, as the highest quality portions of the plant are removed. Still, these losses are typically less than the reduction in yield.

If the terminal growth point, at the top of the stem, is damaged, new growth must happen from buds lower down the stem or the crown. If hail damage occurs earlier than two weeks prior to the scheduled harvest, plants still have potential to produce new crown shoots and a new growth cycle. Harvest should be delayed until this new growth reaches maturity. Table 1 summarizes guidelines for managing hail-damaged alfalfa.



If the goal is to turn the alfalfa into haylage or silage, a form of forage where alfalfa is cut and wrapped in plastic to hold in moisture and induce fermentation, there is a concern soil contamination can adversely affect the fermentation process. If defoliation is greater than 50 percent and occurs less than two weeks before harvest, then the remaining forage should be flail chopped onto the ground immediately, and the next growth cycle should be allowed to grow from new crown shoots.

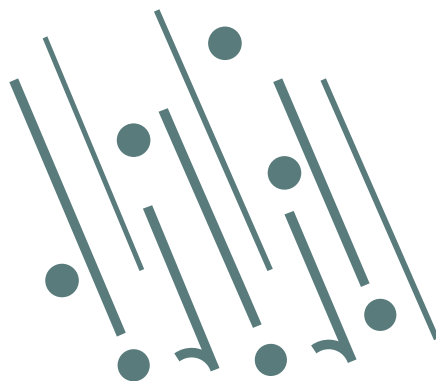


Table 1. Guidelines for managing hail-damaged alfalfa

		Less than 50% of terminal buds damaged	50% or more of terminal buds damaged
Damaged more than 2 weeks before planned harvest	for harvest as hay	wait until normal harvest time - expect reduced yields	wait until regrowth reaches harvest maturity
	for harvest as silage	wait until normal harvest time - expect reduced yields	Flail cut immediately. Wait until regrowth reaches harvest maturity.
Damaged less than 2 weeks before planned harvest	for harvest as hay	wait until normal harvest time - expect reduced yields	Harvest immediately if yield justifies harvest - if lodged, delay harvest 3 to 4 days. If yield does not justify immediate harvest, wait until regrowth reaches maturity.
	for harvest as silage	wait until normal harvest time - expect reduced yields	Flail cut immediately. Wait until regrowth reaches harvest maturity; expect a harvest delay.

Adapted from <http://cropwatch.unl.edu/managing-hail-damaged-alfalfa>

WHY HERE?

With several severe hail storms causing extensive damage in 2016 and 2017 across the state, especially in southeast Wyoming, you may be wondering, 'Why us?'

Similar to tornado alley in the Midwest, the point where Wyoming, Nebraska, and Colorado meet is considered "hail alley." The National Severe Storms Laboratory reports this area averages seven to nine hail days per year. This is because the freezing levels (the area of the atmosphere at 32 degrees or less) in the High Plains are much closer to the ground than at sea level. At lower elevations, hail will often melt before reaching ground.

See how hail forms in this article <http://bit.ly/howhailforms>

Lodging, when alfalfa is laid down by wind, rain, or hail, can also make harvest difficult. Disc mowers, especially those with angled knives, will pick up more forage than sickle bar mowers. Harvesting against the direction the forage is leaning can also increase the amount of forage picked up. If using a sickle bar mower, move the reel forward and down, and increase reel speed to help pick up more of the downed forage.

Annual forages

Hail can also cause concern with some annual forage crops. Nitrate and prussic acid accumulation can increase with stress, including hail damage. Plants use nitrates in protein synthesis, but they can accumulate to toxic levels under stress conditions. In the rumen, nitrate is converted to nitrite, and becomes toxic to the animal when it accumulates faster than it is converted to ammonia. Nitrite in the blood converts hemoglobin to methemoglobin, preventing oxygen uptake in the blood, causing death by asphyxiation.

Prussic acid, or hydrogen cyanide (HCN), is formed in some forages when the enzyme emulsin interacts with dhurrin, also found in these crops. This can occur through

freezing, trampling, and chewing. Death also occurs by asphyxiation as the cyanide also impedes hemoglobin function.

Nitrate Concerns

Annual forages most prone to high nitrates are sorghums, including sudangrass, sorghum-sudangrass hybrids, and grain sorghum. Oats are also prone to high nitrates. Corn can occasionally develop high nitrates. Alfalfa and cool-season perennial grasses rarely have these problems.

Nitrates accumulate most in the lower one-third of the stem and typically are most prevalent at boot stage, just before flowering. New regrowth is often high in nitrates, but stress at any time can increase nitrates, including frost, drought, and hail.

Hail increases nitrates by removing leaf material. This reduces dilution of the high nitrates in the stem and reduces the plant's ability to convert nitrates to amino acids and proteins in the leaves. Freezing can also have similar effects.

Ensiling can reduce nitrates by 50 to 60 percent within a month. Although haying does not reduce nitrates, raising the cutting height to 6 to 12 inches can help minimize the



Those attending a field day near Lingle tour crops beaten and chopped by a hailstorm last year.

amount of stem material cut. If grazing, wait seven to 14 days following hail damage, as new growth may be high in nitrates. Feeding hay prior to turning livestock out can reduce intake, or keeping stocking rates low can help reduce intake of stems, reducing nitrate consumption.

Prussic Acid Potential

Forage sorghums are most prone to prussic acid accumulation, while most sorghum-sudangrass hybrids have low potential. Conditions that promote increases in nitrates can also lead to a buildup of prussic acid.

Silage or hay are safe ways to make use of forage high in prussic

acid, as the chemicals in question are released during the harvest and ensiling process. If grazing, wait until the plant matures, at least to 18 to 24 inches tall, to avoid high prussic acid potential in new growth. Because leaves are higher in prussic acid than stems, heavy stocking rates and rotational grazing that prevent selective grazing of leaves can help as well.

Feeding grain or ground corn can also help with nitrates and prussic acid. Grain helps dilute the amount of nitrate while also providing energy to enhance rumen bacterial conversion of nitrite to ammonia. Grain carbohydrates also tend to inhibit the formation of prussic acid.

Consider Testing Forage

There are management considerations anytime hail damages forage crops. The goals should be to produce a safe crop and to maintain healthy plants for the long-term. If high nitrates or prussic acid is a concern, have forages tested prior to feeding. Contact your local University of Wyoming Extension office to get information on collecting a representative sample and submitting for analysis.

For more information on nitrate and prussic acid poisoning, see the UW Extension publications "Managing forages to reduce nitrate poisoning of livestock" and "Managing forages to minimize prussic acid poisoning," both available at <http://bit.ly/nitrateprussic>.

Caleb Carter offers this kind of advice on crops on his blog *High Plains Cropsite*, officially at www.uwyoextension.org/highplainscropsite, but we use bit.ly/carterknowscrops. He can be reached at (307) 532-2436 or at ccarte13@uwyo.edu.