



Environmental Stress and Forage Quality

Temporary flooding, extended drought, and early or late season freezing of grasses can have a significant impact on forage yield and quality. Each environmental stressor has its own concerns and management issues, and issues are specific to the grass species involved.



Figure 1. Flooded field.

Flooding

Perennial and annual grass, as well as corn fields, can become temporarily flooded. Depending on the time of season, flooding may either completely kill the crop or damage the existing forage. Flooding is usually a relatively short-term situation. If the crop is killed relatively early in the season, an emergency crop can be planted to replace it. (See Grass Information Sheets #26 and 27).

Immediately after flood waters recede, check for any debris that may have washed into the fields that could harm animals or equipment. Flooded forages may pose a health risk for farmers; it is a good precaution to wear a dust mask when handling this forage. Flood damaged crops may be eligible for some reimbursement from federal programs. Contact the Farm Service Agency and make sure to take photos of crop damage.

Perennial grasses. It is likely that silt will be deposited on the existing forage in a flooded field. It is best to mow, remove and discard

perennial forage, allowing for immediate regrowth. If the crop must be salvaged as animal forage, it should be harvested as dry hay. Heavily silted areas of the field could be chopped back onto the field. A better alternative to feeding this hay is to use it as bedding. Flooding will have removed most of the available N in the soil, so additional N fertilization after flooding may be required for reasonable yield in regrowth.

Corn or Sorghum crops. Annual crops should be evaluated to determine if the crop survived flooding. High moisture corn may have the same contamination issues as silage. If possible, harvesting a silted corn crop for dry shell corn instead of silage is preferred. Mowing or chopping corn or sorghum crops at a high stubble height will minimize soil contamination issues. Harvesting sorghum crops at a high stubble height could increase the risk of prussic acid poisoning, if the sorghum used does accumulate moderate to high levels of this compound.

Storage of Flooded Silage Crops. Silage moisture is more critical for flood damaged crops than normal crops. Flood-damaged crops may dry down faster than normal. Yeasts, molds or bacteria deposited by flooding can negatively alter fermentation. Flood-damaged crops stored too wet will have a higher risk of clostridial fermentation. Silage can be inoculated with lactic acid bacteria, probably good insurance for a flood-damaged crop. If silage will be on the dry side, addition of buffered propionic acid products may help to limit growth of undesirable organisms.

Extended Drought

Extended drought can kill both annuals and perennials. This is more difficult to assess for perennial grasses, as some of the grasses go dormant under extended drought, and will appear dead until sufficient rainfall is received. When it is clear that the stand is dead, emergency crops can be considered if early

enough in the season.

Perennial Grasses. Yield will be the most affected by drought; fiber content will likely be higher and CP lower than non-affected grass. The first few days after significant rain will result in an accumulation of nitrates, that may take a week or more to be converted to protein. Nitrate-N exceeding 1000 ppm can cause serious problems for animals. Delaying harvest or grazing, or mowing at a higher stubble height, will result in reduced nitrates.



Fig. 2. Drought-stressed, N-fertilized grass will turn dark green and have high nitrates.

Corn Silage. Yield is affected much more than forage quality, so drought-damage corn silage can be a high quality forage. Silage should be analyzed to properly adjust rations. Nitrates are also a concern for corn, but most of the nitrates accumulate in the lower stalk. Chopping with a high stubble minimizes nitrate risk. Fermentation reduces nitrates by about 50%.

Freezing Damage

It is possible for perennial grass seedlings to be killed by frost in spring or late summer seedlings. This is generally not a concern if planting is timely. Reed canarygrass seedlings are the most susceptible to frost damage.

Corn silage. Slightly immature corn will still make good silage after frost; moisture content needs to be monitored to allow harvest at the appropriate moisture. Frost-damaged corn may not dry down any faster than normal corn, even though leaves curl and dry quickly, giving a false impression of whole-plant moisture content. Frost-damage will encourage mold growth in ears, so harvest should not be delayed for very long. Silage will have slightly higher fiber and slightly lower energy, compared to corn not frost damaged.

Sorghums and Prussic Acid. Prussic acid (hydrocyanic acid) is very toxic to animals. Some sorghum species are low in prussic acid, but most have a high concentration in immature vegetation. Prussic acid is released immediately after freezing, making toxic forage. New regrowth is also very toxic.

Feeding Damaged Forage Crops

Good harvest and silage packing management is even more critical if the forage is damaged. If possible, keep flood-damage forage separate from other forages. If it is absolutely necessary to utilize flood-damaged forage, it should be diluted with another forage source. It is not clear if toxin-absorbing substances, such as bentonite, effectively bind toxins. Do not feed contaminated forage to heifers, as younger animals are more susceptible to toxins.

Summary

Flood, drought or freeze-damaged forage has the potential to contain a variety of anti-quality components that risk animal health. For flooded forage, seriously consider discarding it, unless forage supplies are short. As with all anti-quality components in forages, dilution of the contaminated forage source in the ration is a practical method of minimizing risk.


Additional Resources

- 2011 Cornell Guide for Integrated Field Crops Management. Electronically accessible at: <http://ipmguidelines.org/Fieldcrops/>.

Disclaimer

This information sheet reflects the current (and past) authors' best effort to interpret a complex body of scientific research, and to translate this into practical management options. Following the guidance provided in this information sheet does not assure compliance with any applicable law, rule, regulation or standard, or the achievement of particular discharge levels from agricultural land.

For more information



Cornell University
Cooperative Extension

Grass Management Manual
<http://forages.org>

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