Forage News

MISSISSIPPI STATE UNIVERSITY EXTENSION
Center for Forage Management and Environmental Stewardship

Impact of Rainfall on Hay Production

Volume 16, Issue 7

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July 2023

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Weather conditions, especially rainfall and humidity can pose challenges for hay production in Mississippi and across the southern USA. Since June, we have seen stationary high-pressure centers moving from the west and either delaying cutting hay or baling. Despite weather data, there is always that risk of getting your hay crop wet. Although the data could help in determining the required time to bring hay from its initial moisture in the field to approximately 15% at the time of baling, different factors can impact that window. Some of these factors include plant species, density of the forage, soil moisture, and type of cutting equipment.

Rain damage increases with the amount, duration, and when the hay is harvested. Rainfall can be more damaging on hay that has significant drying time in the field than hay that has been cut just before the rain. Some of the data in the literature have indicated that repeated rain events can have more damage on hay production than a single rain event. Delaying cutting the hay can yield greater biomass (more mature), but it can have a greater negative effect on hay quality than 0.5 to 3.0 inches of rain in a single event. Hay that is closer to baling (drier) is more susceptible to the leaching of nutrients than hay that has been freshly cut under a rainfall event. Nutrient leaching causes dry matter loss, decreases energy value, and increases fiber content. Under wet conditions, losses to plant respiration can be a problem. Plant respiration losses occur when moisture levels are above 30 percent. Hay that has been drying and gets re-wetted by rainfall tends to maintain high moisture levels to prolong respiration and microbial activity causing increased losses in sugars (energy). A slight amount of rain can create the largest losses in both physical and the nutritive aspect of the hay crop. Such losses are due to some of the nutrients being water soluble and loss by leaching (Figure 1).

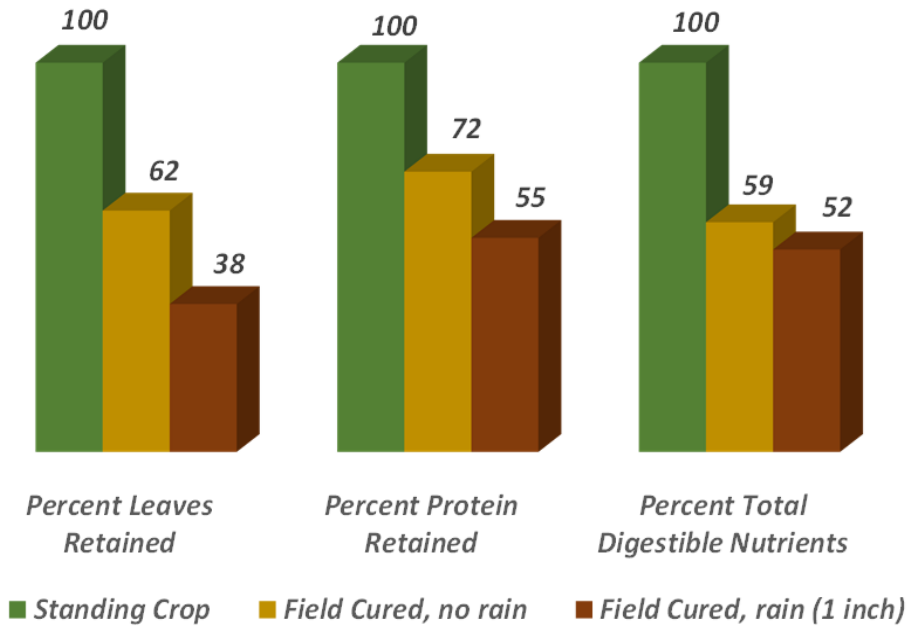

Figure 1. Effect of rain on leaf retention and nutritive value of curing hay. Source: Evans, J.K., 1975.

Three major moisture factors can impact hay production. They are humidity, heavy dew, and soil moisture. The air moving on top of the drying hay must be able to absorb the evaporating water with the air in the atmosphere acting as a sponge or mop, but this is very difficult to achieve when ait humidity levels are above 60 percent. An optimal hay drying process can only be achieved under sunny, warm days where heat has the effect of lowering the relative humidity and increasing the rate at which water evaporates from the plant. Heavy dew can also delay drying time in the south. Most heavy dew will occur on clear nights when the air temperature drops to the dew point and water gets deposited on the leaves and stems. Excessive soil moisture can also slow the drying time by keeping the bottom part of the windrow

moist. In this case, it might be ideal to spread the hay in a wider swath. There is also a trade-off that cutting at a very early maturity can result in forage crops with higher moisture content and more drying time might be required. On the other hand, mature crops tend to have less moisture but at the same time, higher fiber content and lower nutritive value. Therefore, balancing biomass production and nutritive value are important components of the hay-making process.

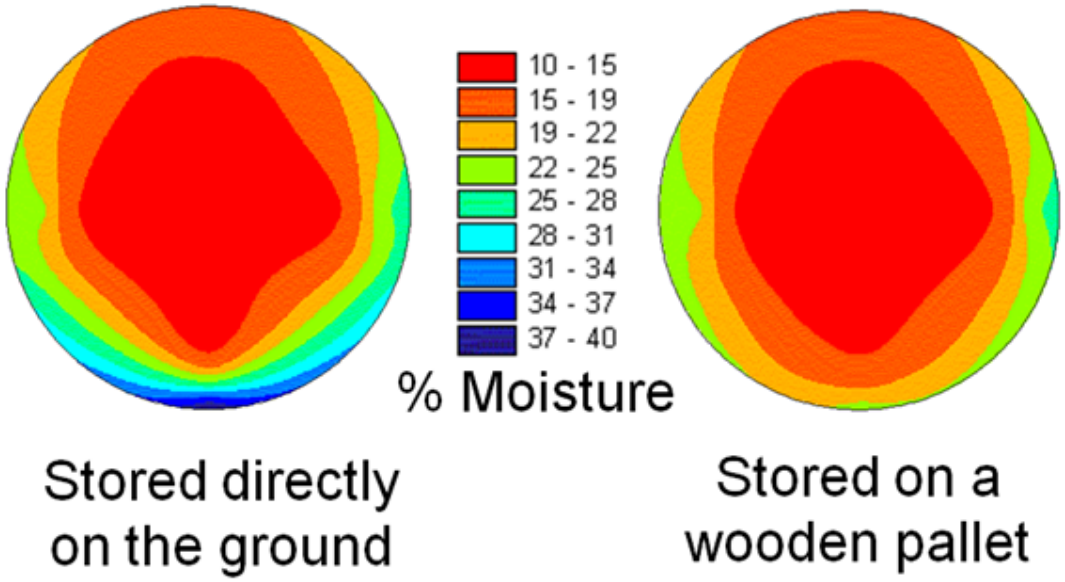

Figure 2. Impact of storage method on hay moisture absorption when stored outside. Shinners, K., 2008.

The storage of high-moisture bales is also an important component. Although properly storing hay in a barn can reduce hay losses, storing high-moisture bales of hay in a barn can have a significant risk. High-moisture bales packed in a barn can reach internal temperatures that exceed 170 degrees Fahrenheit and increasing the risk of fire. To avoid this issue, moisture bales that are stored inside should be monitored for at least 10 to 20 days depending on the forage crop. On the other hand, forage crops baled at high moisture or left to soak in the rain can also have increased degradation or spoilage. These bales will lose their shape, making them more vulnerable to damage from subsequent rain because they will not effectively repel water. A round bale with a sixty-six-inch diameter has approximately 59.5 percent of the total biomass in the first twelve inches. That means that a round bale that is showing discoloration and degradation in the first six inches is losing about 30% of the biomass. In a 1,000-pound round bale, that means 300 pounds of dry matter which should be sufficient to feed a 1,000-pound mature cow for 10 days. If bales are to be stored outside, then it will be recommended to wrap, cover, and place the bales in a dry area to reduce the chances of additional damage. Place the bales in a well-drained storage area or elevate them in either gravel, pellets, or tires to help decrease moisture absorption from the ground into the bottom of the bale. It is also important to align the bales in a north-south orientation with at least three feet between rows and end-to-end within rows to allow air and sunlight to pull moisture from the bales.

Some producers are taking the approach of baling high moisture content forages and putting them into baleage (bales wrapped in plastic). It is important to remember that the ideal forage moisture content for baleage production ranges from 40 to 60 percent with 50 percent being ideal. Wrapping bales at incorrect moisture content is a recipe for disaster. Wet forages are more likely to spoil. This can also create the accumulation of bacteria from the *Clostridia* family. These bacteria thrive in wet environments where forage moisture range from 65 to 70 percent. This bacteria can cause botulism. The toxin is produced by *Clostridium botulinum*. Type B of the toxin is associated with improperly fermented forage.

One of the common mistakes that producers make is leaving baled hay in the field. This also increases moisture penetration and retention which leads to a decrease in forage biomass and nutrient losses. Higher moisture bales may undergo heating and provide a favorable environment for mold growth and increase animal refusal at the time of feeding. It is recommended to collect a forage sample from rain-damaged hay and send it in for nutrient analysis to determine overall feed value and suitability. Contact your County Extension Office for sample collection and handling.

Upcoming Events

For upcoming forage related events visit: ***http://forages.pss.msstate.edu/events.html***

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