OHIO STATE UNIVERSITY EXTENSION

PURCHASING HAY EQUIPMENT – TEDDERS AND RAKES

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Introduction

After mowing a forage crop, the next step in the hay making process is to dry down the forage to a suitable content for the end use. Forage intended for dry hay production should be at 20% moisture or less before baling. Hay baled at the correct moisture decreases the risk of spoilage and hay fires while maintaining nutritional value (AGF-013-92). If baleage or silage is the intended product the moisture can be much higher, but usually not over 60%.

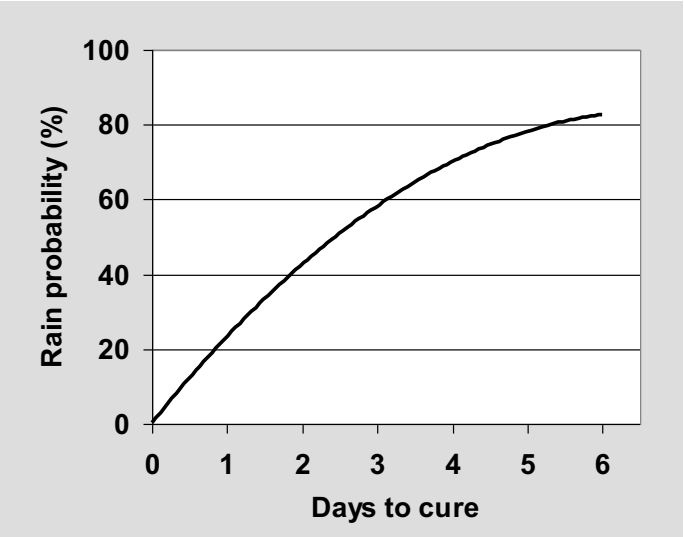


Figure 1. Probability of rain following mowing forages in Southern Ohio. Mark Sulc.

Fast dry down of hay after mowing is important for several reasons. The primary concern with hay drying is to avoid rain in the forecast. Figure 1 shows the probability of rain in the days that follow cutting hay. Here in Ohio, we typically have a three to four day window to get hay mowed, dried, and baled before the next rain. Rapid drying also prevents the loss of structural carbohydrates and sugars which retains more feed value (Undersander, Wisc.).

The equipment you choose to dry your hay can directly influence the quality of your hay. Choosing the wrong piece of equipment or using a machine incorrectly can directly decrease hay quality. Leaf loss and ash (dirt) incorporation are major concerns during the drying and raking process.

Tedders

Drying hay starts with proper mower and conditioner settings. After mowing there are several pieces of equipment that you can use to aid in the drying process. Hay dries from the top down in the swath and inverting or spreading out the swath will speed up the drying process. The most widely used tool to aid dry down is the hay tedder. Tedders work with a series of counter

Tedders are used to spread hay to promote drying. The two-basket tedder pictured here is ideal for a small farm. Photo by Beers.

rotating arms with attached tines to pick up the hay from the field and spread it out on the field. This action exposes more surface area of the forage to sunlight and air movement. Tedding soon after mowing can reduce drying time by about one to two days (Rotz, USDA). Tedders are aggressive machines and can lead to leaf loss which is a larger concern in legume crops. Inverter type machines which lift the hay swath, turns it over to expose the damp bottom, and then returns the swath to the field damp side up are generally considered gentler and tend to minimize leaf loss.

Tedders can be sized to fit any operation from 8' working width to over 50' for large operations. The smallest tedders will generally cover one hay swath at a time and require only a tractor with a PTO (>30HP). As the size of the tedder increases horsepower requirements increase, and hydraulics are typically used for folding the tedder for easier transport and storage.

Tedding is an effective tool to promote drying, but repeated passes over the hay crop may increase ash content and lead to leaf loss. To minimize ash content tedders should be set to pick up mowed hay without contacting the soil. As mentioned, tedders are aggressive machines and multiple passes over a field may result in higher leaf loss.

Hay Rakes

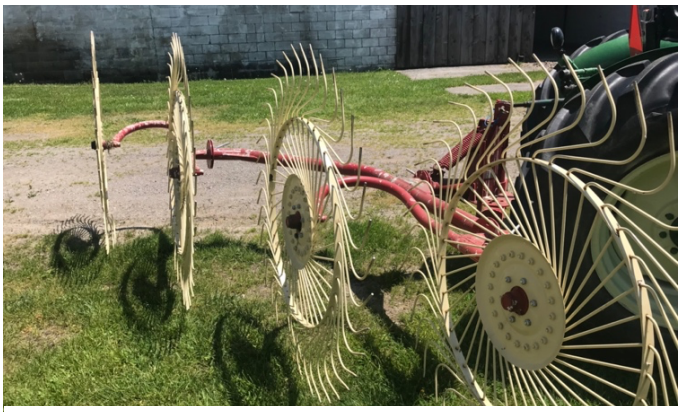
When the hay reaches the appropriate moisture for baling it will need to be collected into windrows sized to the baling equipment. Hay rakes are the most common method for gathering hay, but a specialized hay mergers are also popular for larger farms with alfalfa crops. Smaller rakes will typically clear a swath of less than ten feet and work well with small square balers which typically have a lower hay capacity then larger round balers or large square balers. For larger balers, or thin hay crops, a larger capacity rake will make the raking and baling operation more efficient. V-style or center delivery rotary rakes can limit your ability to adjust windrow size compared to a side delivery rake.

There are many types of hay rakes available, but the most commonly used is a bar rake due to their availability, and relatively low price – especially on the used market. These rakes function by rotating parallel bars with rake teeth that gather the hay and deliver it to one side. Although there are PTO and hydraulically driven options, the most common form of operating is ground drive through a gear box or other mechanical

Bar rakes are very popular due to their availability on the used market, and ease of use. Most are ground driven, but they can also be PTO or hydraulically driven like the one above. Photo by Ruff.

drive from the wheels. Without a PTO, this type of rake can be used with many types of equipment and ground speed can be tailored more easily for crop conditions without worrying about PTO speed. Bar rakes have a tendency to gather the hay and twist it as it is delivered to the side, called "roping". This can reduce air flow and increase dry time.

Increasing in popularity is the wheel rake. These ground driven rakes gather hay when the rake wheel touches the ground at an angle, and the forward movement causes the wheels to turn moving the hay to the side. These rakes can be as small as two wheels that attach to a three-point hitch, to large 20 wheel (or more) pull type rakes. Larger wheel rakes can move a lot of hay that increases capacity for larger round balers, and large square balers. These rakes are popular due to the ease of maintenance (few moving parts), adjustable windrow size, lower cost, and the speed of raking. Wheel rakes rely upon ground contact for operation



Wheel rakes rely upon contact with the ground to rake hay. They are economical, have few moving parts, and can cover a large area in one pass. Wheel rakes doe increase ash content relative to other styles of hay rakes. Photo by Beers.

which can result in higher ash and damage to stubble. Correct settings are necessary to reduce the amount of uncut forage pulled into the windrow leading to increased drying time.

Rotary rakes are also a popular choice with many hay producers as they are generally gentler on the hay crop. Rotary rakes have a large rotor with arms attached that carry rake tines. As the rotor moves the arms in a circular motion, the tines lower to the ground, rake the hay into the windrow where the tines then lift to release the crop. By minimizing tine contact with the ground rotary rakes will generally have a lower ash contribution to hay than wheel rakes. This raking action also results in a fluffier windrow that promotes additional drying. These rakes are operated by PTO so ground speed needs to match the crop. Single rotor rakes (up to 15ft in diameter) work well for small to medium size farms, but multiple rotor machines are available for larger capacity. Compared to bar or wheel rakes, rotary rakes are generally more expensive to purchase and are more mechanically complex.

Minimizing External Ash Content and Leaf Loss

External ash content in hay is typically from soil disturbances during the hay making process. Higher ash content results in lower feed quality, so minimizing soil contact is necessary to produce high quality hay. Research comparing different hay rake types have shown that wheel rakes significantly introduce more external ash than bar or rotary rakes (Neu et al., 2017). This research also showed that mergers are the best option to reduce external ash content in baled hay. High ash content in forage may contribute to reduced milk and meat production, so choosing the correct rake can have economic impacts beyond the initial purchase price.

Much of the nutritional value of a hay crop is found in the leaves of the plant. This is especially true for legumes, so leaf loss during the hay making process results in lower quality feed. Strategies to minimize leaf loss can include tedding immediately following mowing, raking with a dew on the windrow, and choosing a drying method that is gentle on the hay crop. Generally, the drier the hay crop during tedding or raking the higher the rate of leaf loss.

Rotary rakes lift and move hay into a fluffier windrow that promotes additional drying. Photo by Beers.

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