OHIO STATE UNIVERSITY EXTENSION

Forage Mowing Equipment

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Introduction

The first step in the hay making process begins with mowing the forage crop at the appropriate stage of maturity to best optimize yield and forage quality. Mowing and conditioning methods can influence drying time, quality, yield, and regrowth of the forage.

Types of Forage Mowers

Mowers can generally be broken down into two basic components – how the crop is cut and the conditioning method (if present). For the purpose of this publication the different types of mowers available will be lumped into two categories, those with conditioners and those without. When deciding which hay mower to purchase consider what will best complement your forage production needs and available horsepower on your farm.

Sickle Bar Mower

One of the earliest designs to mow forages, and still commonly used among small acreage and Amish farms.

The sickle mower operates with a reciprocating action where a series of knives (called sickle sections) move back and forth as the mower is pulled forward.

Advantages – lightweight; requires least amount of horsepower; relatively inexpensive.

Disadvantages – slowest mowing option; potential to clog in heavy forage stands.

Disc Mower

Similar to a sickle bar mower a disc mower has a cutter bar, but rather than a series of reciprocating blades, there is a series of discs with blades that spin opposite of one another, similar to a lawn mower. The rotating blades and cutter bar design allow for cutting forages closer to the ground.

Advantages – increased speed; lower risk for clogging; less blade maintenance than sickle mowers.

Disadvantages– requires hydraulics; potential to cut grass too short; increased weight of machine; increased cost over sickle bar mower.

Table 1. Relative tractor requirements for most* models of forage mowers.
*Evaluate mowers based on what best suits your farming operation and budget.

Tractor Requirement	Mowers			Mower Conditioners	
	Sickle Bar	Disc Mower	Drum Mower	Sickle Mower Conditioner	Disc Mower Conditioner
3 Point Hitch	Some Models	Most Models	Most Models	None	None
Hydraulic Remotes	0-1	1	0-1	1-2	2
Horsepower	Low	Medium	Medium	High	High
Front End Weight	Low	Medium	High	Low	Low

Photo: 3 Point Hitch Disc Mower

Drum Mower

A European design that is becoming more popular in the United States with small acreage hay producers. Drum mowers work in a similar manner to disc mowers with rotating blades, but the blades are attached to a drums driven from above commonly by belts rather than a cutterbar driven by gears in disc mowers. This design windrows forage between the oppositely rotating drums.

Advantages – no hydraulics needed; machine durability; high ground speed; low horsepower requirements.

Disadvantages – the weight of machine makes for difficult maneuvering on slopes, especially for tractors that are light in the front end; windrowing the forage requires tedding or inverting to allow for proper drying; shorter mowing widths.

Photo: 3 point drum mower (left) and counter rotating drums with knives that cut hay (right).

Mower Conditioners

Some of the most common forage mowing machines in Ohio are mower conditioners. These machines cut and condition the crop in one pass to promote faster drying. Sickle mower and disc mower conditioners are available and can be purchased with two general conditioning methods – roller/crusher type or the impeller/tine type. With the addition of the conditioning function to the mower, there is an increase in required tractor horsepower.

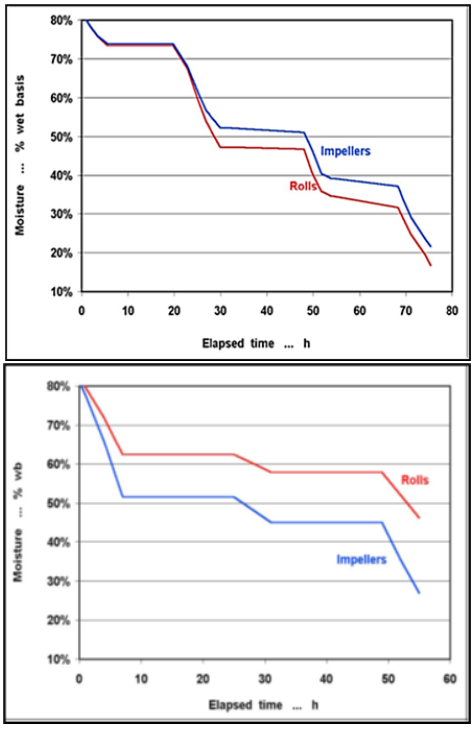
Sickle mower conditioners can be run with smaller tractors and are generally less expensive than disc mower conditioners. These machines are good for smaller acreage farms due to their slower speed, and lower horsepower requirements.

Disc mower conditioners will require larger tractors to run efficiently, but some models are advertised with a minimum PTO horsepower of 65. These machines operate at a higher speed, and will most likely require auxiliary hydraulics.

Conditioning Systems

A properly adjusted conditioner can significantly reduce the drying time of the hay crop (Figure 1). There are two different conditioner designs two choose from depending on the primary forage crop being harvested. When harvesting or mowing legumes; alfalfa or clover, a roll type conditioner is most desirable. The rolls creating a crimping effect of the stems of the legumes, while minimizing leaf loss.

Figure 1. Drying times of alfalfa (top) and grass (bottom) forage with varying conditioning methods. Undersander, 2007.



When mowing predominately grass hay, an impeller or flail type conditioner will aid in reducing drying time. This design uses free-swinging impellers against a conditioning hood. As the forage goes through the conditioner the impellers strip off the protective waxy coating of the grass. Impeller or flail type conditioners have a 1-4% higher leaf losses in alfalfa compared to roller type. Mowers with flail conditioners also require less horsepower compared to roller conditioning systems.

Numerous studies have shown that having a conditioning system properly adjusted has a greater effect on drying time than type of conditioning system used.

Conditioner Adjustments

Having a properly adjusted conditioner is key to managing drying time of forage once it is cut. When adjusting a roller conditioner, the rolls should be close enough to crimp the stems of the forage. For most mower conditioners the range of roll clearance should be between 1/16 and 3/32 of an inch. Be sure to check your owner's manual to make proper adjustments. Rolls that are too close will cause additional leaf loss and excessive wear to the rolls. Clearance greater than what is defined in the owner's manual for the machine will result in poorly crimped forage and longer drying times in the field.

The following instructions from Shinners, 2002 explain one method of determining if a roller conditioner needs adjusting.

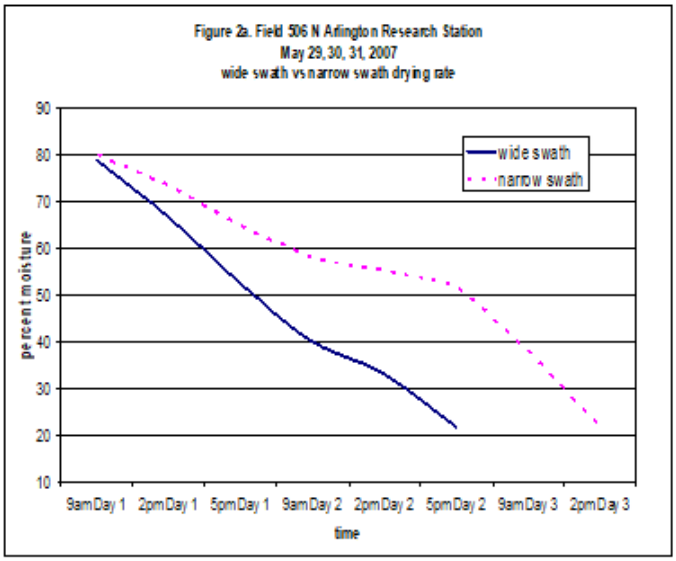
Before performing any maintenance or adjustment s on a mower conditioner: 1) Shut off the tractor engine, 2) Disconnect the mower conditioner from the tractor PTO, and 3) Lower the cutter bar.

PROCEDURE
1. Cut three (3) pieces of typical household aluminum foil 18 inches in length. The foil strips should be at least 12 inches wide.
2. Take each strip of foil and wrap around a rod that is 3/8 of an inch in diameter. Slide the roll off the rod, being careful not to crush the foil tube.
3. Place one foil tube in the approximate center of the conditioning rolls and the remaining two foil tubes about 1 foot from each end of the conditioning rolls. The foil tubes should be placed perpendicular to the roll longitudinal axis.
4. Make sure the cutting platform is fully lowered. This is the safest way to make this measurement, additionally on some mower-conditioners, raising the platform increases the clearance of the rolls preventing an accurate measure of the minimum roll clearance.
5. Turn the rolls over by hand until the foil tubes come completely through the rolls.
6. The rolls will crush the foil tubes and the minimum roll clearance can be determined by using a digital or dial caliper to measure the thickness of the foil tube. Take several measurements of the thickness along the length of each foil tube and determine an overall average. The measurement should be taken where the "crimp" or smallest clearance occurs.

Swath Width

Mower conditioners typically have adjustments that can be made to narrow or widen the width of the hay swath as the forage exits the conditioner. With wider the swath is, the faster the forage will dry. When possible, to promote faster forage drying the swath should cover close to 70% of the total mowed area, Undersander and Saxe, 2013.

Figure 2. Comparing drying times of wide and narrow swaths of mowed forage. Undersander and Saxe, 2013.



Used Equipment Considerations

When purchasing used forage mowing equipment, one should evaluate not only the condition of the piece but consider maintenance and lubrication history as well. Examine wear on cutter bars and blades, gear box lubrication, and condition of the rolls or impellers on the conditioner. Parts displaying excessive wear may need replaced adding to the cost of the machine.

References

Shinners, K. J. 2002 Getting the Most from a Mower-Conditioner. Presented at the 2002 Wisconsin Forage Symposium.

Undersander,D. Conditioners for Hay and Haylage. 2007. University of Wisconsin. Presentation

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