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# Hay Conditioning

Cooperative Extension, South Dakota State University

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# Hay Conditioning

Anyone who has put up a crop of hay knows how important it is to get it up as soon as possible after cutting. The sooner it is in the stack the less chance that it will get wet, bleach, or lose its leaves. Yet hay has to dry out long enough so that it will keep in the stack or in the bale.

Field drying time has become important in modern farming. Hay conditioning machinery is being used to speed the process. These machines are designed so that slow-drying stems are split, cracked, crushed or broken as they pass through rollers or knives. Three types are the crusher, the crimper, and the flail harvester.

**The crusher has two flat rollers under spring tension which actually crush stems as the hay passes through.**

**The crimper has two corrugated rollers which crack the stems every two or three inches as the hay passes through.**

**The flail harvester has loose pivoted knives on a horizontal cylinder. These knives chop the hay in about six-inch lengths and also crack the stems vertically.**

The basic purpose of each machine is the same: to crush or crack the stems so they will dry at about the same rate as the leaves. The result is more uniform curing and less leaf loss.

### HOW THEY OPERATE

The crushers and crimpers pick up the hay from a swath, pass it through a set (or sets) of rollers and drop it back into the same swath. Usually they operate directly behind the tractor and condition the hay that was cut the previous round.

Some units can be purchased that both mow and condition the hay with the same power transmission system. Conditioners also can be a separate piece of equipment. These are cheaper to buy, but it means that you must go over the field twice. This would be practical for small acreages.

The flail harvester cuts the hay and conditions it in one operation or it will also condition hay that is in the windrow. It operates something like a silage cutter with a blower tube and down spout which places the hay back on the ground in a windrow.

### ADJUSTING CONDITIONERS

Remember conditioners are not designed to take moisture out of the plants. They merely crush or crack the stems so they will dry out at the same rate as the leaves. Rollers should operate "wet" but should not squeeze out excessive juices. Rollers should be set so that the little juice that appears is transferred to and dries on the surface of the plant.

The best crushing job results when the roller speed is high in comparison with the ground speed of the machine. This has to be controlled by the forward speed of the tractor. Slow speeds are best for crushing, higher speeds will generally eliminate clogging but result in less thorough crushing. The design of the machine has some affect on clogging, and reducing pressure on the rolls will also help.

Flail harvesters are best when hay is chopped in long lengths. You can cut hay in longer lengths by removing the shear bar or some of the knives. Be sure to remove knives on opposite sides of the cylinder to keep it in balance at all times.

### HOW SUCCESSFUL ARE HAY CONDITIONERS?

Hay conditioners were used in tests at the South Dakota State College Experiment Station on alfalfa hay. Drying times of conditioned and unconditioned hay were compared, both in the swath and in the windrow. Findings showed that hay dried faster in the swath, but it must be handled carefully and at the correct time. If it is not, leaf losses and nutrient losses increase.

The crushed or crimped swaths dried faster than the unconditioned swath under both good and poor drying conditions. But the benefit from crushing was reduced when drying conditions were poor. When drying conditions were good the drying period was speeded up about one-third. Fig. 1 gives you an idea of the rate of drying for crimped and uncrimped hay in the swath.

Fig. 2 shows that hay that was windrowed immediately after it was cut and conditioned, dried faster than windrows of unconditioned hay, except when

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windrows were tight and compact. When drying conditions were poor (three light rains and two heavy dews over a five-day period during one test) the windrowed crushed hay took on less moisture and lost moistude faster than the uncrushed windrows did.

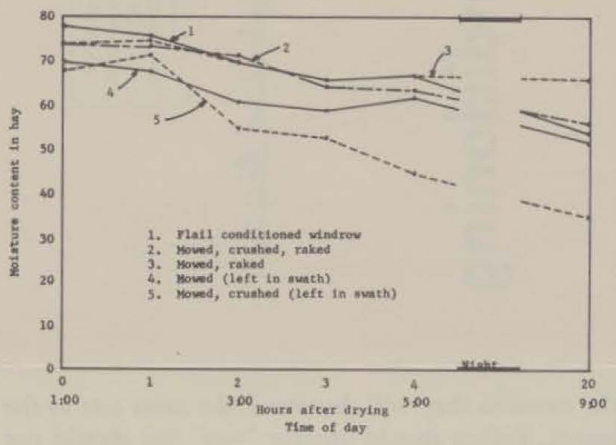


**Fig. 1. Drying progress of crimped and uncrimped alfalfa hay.**

For comparison (Fig. 2), the flail harvester windrows were made of the same size as the crushed or crimped windrows. The flail conditioned windrows dried out at the same rates as the other conditioned windrows when drying weather was good. However, during the wet period they took on more moisture and held more moisture than the unconditioned windrows did. Apparently this is the result of the excessive compacting and settling of the windrows. There seemed to be a considerable number of leaves lost or shattered on the ground under the flail conditioned windrows in every case. However, this loss was never measured.

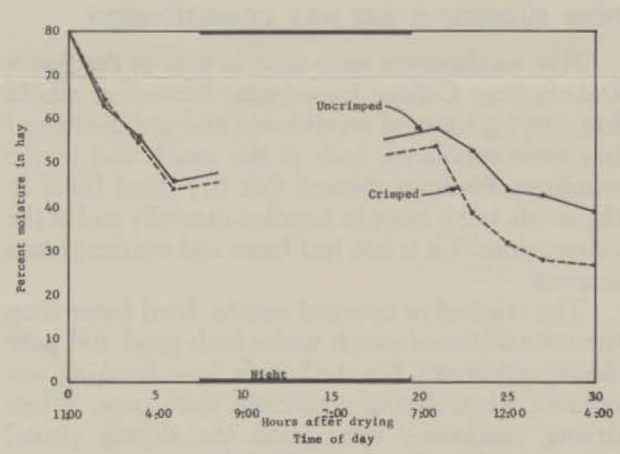


**Fig. 2. Drying progress of conditioned and unconditioned windrows and swaths for alfalfa hay.**

## DOES IT PAY TO USE A CONDITIONER?

These questions have to be answered by each farmer individually. **Can I use the time I save for something else? Am I usually short of good high-quality hay?** Conditioning should increase the quality and yield. This in turn should produce better livestock gains with a smaller amount of feed.

**If the hay is to be sold, can I get a higher price for the hay that is of higher quality?** If he is thinking of buying a hay conditioner, he must decide whether these benefits will be enough to offset the initial cost of the machine and the cost of operation.

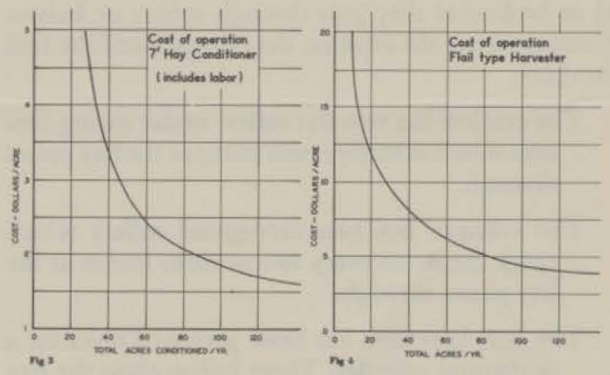


**Fig. 3. This graph gives the approximate cost of operation, in dollars per acre of a 7-foot hay conditioner. The total acres covered in the conditioning operation each year should be located on the horizontal scale. Taking a vertical line from this point, to its intersection with the curve, will give the approximate cost in dollars per acre on the scale at the left side of graph.**

**Fig. 4 This graph gives the approximate cost of operation, in dollars per acre, of the flail-type forage harvester in relation to total acres covered by it per year. The vertical scale for cost is given in higher dollar segments than the scale in Fig. 3. This is because of higher initial costs and operating costs for this machine. However, this machine can be used for harvesting methods other than conditioning. Therefore, all harvesting acreage use should be used on horizontal scale to obtain acres per year.**

Although hay conditioning can produce more and better quality hay in less time, other methods of getting similar results should also be considered. How about an artificial drying system for hay? This is one possibility. It can be used in conjunction with or in place of hay conditioning. Another alternative would be to harvest the hay as haylage. The economic success of this method would depend on existing facilities and equipment for handling and storage. It would also depend on how the hay is to be used. If the hay is to be sold, haylage would not be the best method, whereas it might be if feeding was the major use.

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