

Reducing Alfalfa Harvest Losses

Cooperative Extension Service
College of Agriculture and
Home Economics



Guide A-318

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This publication is scheduled to be updated and reissued 8/01.

Alfalfa hay is an important commodity in New Mexico. Growers strive for high yields of good quality hay. When producers and agronomists discuss alfalfa production, they usually talk in terms of growing the crop. Most questions and management decisions involve topics like seed-bed preparation, seeding rate and date, variety selection, fertilization, irrigation, pest management, and timing of harvest.

Little consideration is given to the losses in yield and quality that can occur during the harvesting and packaging operation. However, estimates of 30% to 70% of the potential crop is normally lost during the harvesting operation.

The most obvious losses are the result of rainfall between cutting and baling. Damages are usually attributed to mold, mildew, fermentation, and bleaching. Less obvious losses are leaching of nutrients from the hay, respiration, and leaf shattering.

Several studies conducted in the United States and in Australia indicated that wetting hay reduced the leaf content in bales by up to 15%. Other losses included 34% of the nonstructural carbohydrates, 10% digestibility, and 25% of the protein yield. Wetting also resulted in an increased fiber content of 6 to 10%. Hay yields were usually reduced by 20 to 40%. Variation in the amount of damage encountered was the result of prior mechanical treatments, amount and frequency of rainfall, and the percent moisture in the hay when rainfall occurred.

One partial solution to reducing these losses is to shorten the time the hay cures in the field. Until recently, mechanical conditioners or crimpers have been the only practical method available to encourage faster drying. Estimates of dry matter losses attributed to crimping are as high as 13%. Rain damage is also higher on crimped hay be-

cause of leaching and in creased moisture uptake. Conditioners also require continual adjustment to function properly.

Several chemical drying agents are now on the market. Results indicate the curing time can be reduced by 50 to 70%, with windrowed hay reaching baling moisture levels 12 to 24 hours after swathing.

These chemical drying agents are applied to the standing hay from units mounted on the swather. These chemicals break down the waxy cuticle layer on the stem, which increases the rate of moisture loss. A second benefit is that leaves are not as brittle when the hay is baled, resulting in less leaf loss. A major problem at this time is the need to carry large quantities of the drying agent mixture on the swather. Studies are now underway to evaluate low volume, controlled droplet size applications.

Preliminary studies using the Haybine¹ swather indicate the hay drying rate is significantly faster than with a conventional swather-wind rower, and approaches the drying rate obtained with chemical drying agents. It may be possible to combine chemical drying agents with the Haybine system and bale hay the same day it is cut.

Another method to shorten curing time is to bale at higher moisture content than normal. There are presently several hay preservatives available which are designed to prevent spoilage in high moisture hay. The preservatives are applied to the hay as it enters the baler.

Research conducted at the NMSU Southeast Branch Station has shown that propionic acid and sodium diacetate preservatives were effective in

¹Use of a trade name does not constitute endorsement or recommendation by the New Mexico Agricultural Experiment Station or the cooperative Extension Service.

preventing spoilage when applied to hay with up to 25% moisture (based on forced-air dried samples). Biotic preservatives, similar to silage preservatives, were effective up to 22% moisture. Hay baled at higher than normal moisture using preservatives doubled the yield of baled hay (after adjustment to 14% moisture), and increased the protein by 8% when compared to conventional practices. After two months storage, the preservative-treated hay had better color, higher percentage of leaves, less dust, mildew and odor than the conventionally baled hay.

The cost of adding a preservative ranges from \$1 to \$5 per ton of hay. Because of the added cost of preservatives many growers are using the pre-

servative as a safeguard system. They begin baling slightly earlier with the preservative than they normally would and, when wind row moisture is suitable for conventional baling, discontinue using the preservative. Preservatives can also extend the baling time at night when dew moisture would normally halt the baling process. Producers using the large square balers often use preservatives as insurance to prevent bale kick-back resulting from spoilage.

One problem with baling high moisture hay is the shrinkage encountered in storage. However, the increased yield for the producer and increased quality to the customer should help offset shrinkage losses.