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Harvesting Alfalfa Hay

Biological and Agricultural Engineering

Alfalfa hay will yield 5 to 8 tons per acre per year during seasons with good moisture. Good varieties, weed control and moisture can make a seeding profitable for three to eight years on deep, well-drained soil in Arkansas. Four cuttings a year are typical. Good management and a warm fall may provide a small fifth cutting.

Alfalfa hay quality is improved with more leaves and fewer weeds. Timely hay harvest results in leafy forage with high feed value. The most economical alfalfa is high in palatability, digestibility and protein. **Harvesting alfalfa with as little leaf loss as possible is the key to making premium hay**. High-value forage provides more return for the operation of costly hay equipment and increases protein stored within your hay barn.

Leaves contain two-thirds of the protein and 75 percent of the total digestible nutrients (TDN) in alfalfa hay. Harvesting the maximum amount of the leaves is a profitable way to produce alfalfa. Practical ways of doing this are:

1. Timely harvesting with respect to alfalfa maturity,
2. Curing hay rapidly and baling the day after it is mowed and
3. Placing management emphasis on harvesting **alfalfa leaves**.

Harvesting Protein

Harvesting alfalfa at the 1/10 bloom stage provides the best compromise between yield and quality. At this maturity, alfalfa consists of 50 percent leaves and 50 percent stems. Early harvest increases the leaf portion; leaves comprise more than 80 percent of alfalfa that is 4 to 5 inches tall. Harvesting at this immature stage provides extremely high-quality forage but low forage yields. The stand is also likely to be damaged.

Cut only the alfalfa hay in one day that you know you can bale in one day. If weather is threatening, reduce the amount mowed. Baler capacity often is greater than that of the hay hauling crew or the round bale mover. A disc mower cuts hay so rapidly it is easy to lay down more hay in a swath than can be raked before leaves begin shattering.

Table 1. Changes in Alfalfa Quality With Rain Damage

	Crude Protein (%)	Digestibility (%)	Dry Matter Yield (tons/A)
Standing crop	23	70	2.0
Hay – no rain	20	64	1.7
Hay – rain damaged	20	57	1.5

Ideally, alfalfa hay should be in a bale and under cover before it rains. Rainfall on alfalfa hay is much more serious than the same rain on grass hay due to alfalfa leaf loss. Leaf shatter and leaching reduce protein and carotene content as well as other factors of hay quality.

Dairy producers, horse owners and other livestock producers desiring a premium forage seek alfalfa. Small rectangular bales fit many of the low-volume, limit-feeding enterprises. High-density rectangular bales contain more hay per cubic foot, thus they can be trucked or stored economically. If high-quality alfalfa hay is your goal (without regard to harvesting capacity), rectangular bales stored under a roof have an advantage over other hay baling and storing systems.

Rain

Dairies feeding hundreds of tons of hay annually should consider using alfalfa silage. This is an excellent alternative for cuttings exposed to an untimely rain. More of the forage quality is preserved if the crop is ensiled at moisture content between 50 and 70 percent. This saves leaves. Alfalfa makes excellent silage or haylage if facilities for silage are available.

When hay curing is reduced from three days to two days, the probability for making quality hay is boosted. You can improve the likelihood of making dry hay by watching weather forecasts and noting times when high (barometric) pressure air masses are approaching. Periods of rising or high barometric pressure have a low rain probability.

Late bud or pre-bloom is an excellent compromise time for harvesting hay if it allows you to complete harvest without getting hay wet. The interval between fronts with potential rainfall often averages less than two days in May. Timing of the first cutting should coincide with a good three- to five-day dry weather forecast. The probability for harvesting without rain is greater in July, August and early September when fronts pass less frequently.

Table 2. Probability* for Successive Rain-Free Days for Hay Harvesting
(Data for Springfield, Missouri Weather Reporting Station)

Date		3 Successive Rain-Free Haying Days	2 Successive Rain-Free Haying Days
May	1-10	16	28
	11-20	19	32
	21-31	17	28
June	1-10	20	32
	11-20	25	33
	21-30	27	37
July	1-10	33	50
	11-20	25	45
	21-31	32	46
August	1-10	27	40
	11-20	23	34
	21-31	35	48
September	1-10	32	42
	11-20	37	46
	21-28	18	36

*Expected number of rain-free periods out of 100 if selection is random, without considering approaching weather patterns.

Rapid Curing

On the average, 78 percent of alfalfa cut reaches livestock in the United States. The remaining 22 percent is lost during mowing, raking, baling and storage. Hay volume and quality losses are costly.

Alfalfa should be cut with a mower-conditioner and left in a wide, well-aerated swath. Aggressive conditioners break and lacerate the stem, increasing stem-drying rates. This minimizes "rubbery" green stems when the leaves turn powdery dry. Mower-conditioners can fluff alfalfa so the swath is supported on cut stubble. Discharging hay so it resists settling back close to the soil is very important under Arkansas conditions.

Tedders are used for hay that is packed down onto the soil by rain or for turning windrows off wet soil. Alfalfa should be tedded when it is "tough," normally 40 to 50 percent moisture content. Often during the hot part of summer, hay dries rapidly from 75 percent moisture down to 40 to 50 percent. Leaves can be saved if alfalfa is tedded or raked for baling when it is still tough, before the leaves become brittle. This may require some night raking or tedding in order to finish before moisture in the hay drops below 35 percent.

Tedders are also used for turning alfalfa windrows that have cured and received rainfall. However, the best alternative for dairymen who have wet hay in a windrow is to make silage of it.

Windrowing hay before it reaches 50 percent moisture promotes matting and poor aeration. Wet soil retards the hay-drying rate and inevitably causes substantial leaf shatter in addition to nutrient leaching that occurs in conjunction with rainfall. Three years of data in Tennessee show that tedder-fluffed windrows will dry faster than tighter, raked windrows (60 to 85 percent cross-section area compared to tedded hay) **when the wind exceeds 4 miles per hour**.

Three Alfalfa Haying Rules

1. **Lay alfalfa swaths as open as possible for aeration and keep the hay windrow up on the stubble rather than in contact with the soil.**
2. **Rake or ted alfalfa before the moisture reaches 35 percent and leaves shatter.**
3. **Form uniform, loose windrows so lumps or "ropey" windrows don't retard curing.**

Baling

One of the criteria for selecting a baler is its ability to retain leaves in the bale. All rectangular balers are less aggressive and enclose the leaves in the package without repeated tumbling and wrapping. Rectangular balers with good hay pickups and gentle handling may cause a loss of only 2 to 5 percent. Round balers with poor gathering and less gentle hay packaging cause alfalfa baling loss to vary from 5 to 15 percent.

A hay producer balances hay harvest labor, equipment cost and the cost of hay storage to determine the best harvest system. A factor that should not be overlooked is the difference in hay storage capacity in a properly designed hay shed. Premium quality alfalfa should bring a field price above $80 per ton, justifying better storage facilities than native hay worth less than half the value of alfalfa. High-density bales are justified for more economical trucking and storage.

Table 3. Approximate Storage Space Required for Hay Bales

Alfalfa Bales	Bale Density (lbs per cu ft)	Storage Space (cu ft per ton)
Small rectangular	13	154
High density round	13	213
Low density round	8	346

First Cutting

Taking the first cutting at 1/10 bloom stage is a sound practice. This timing provides a good combination of high nutrition quality and yield. Cutting at this stage of growth allows the alfalfa to restore root reserves depleted during winter dormancy. This helps maintain stand density and longevity.

One exception to this rule is early harvest to avoid alfalfa weevil damage. The first harvest may be scheduled as early as bud stage before blooms are visible. The dead insects are removed from the field with the hay. Also, the food source for any weevils that escaped the harvest is also removed. This will usually eliminate the threat of this pest for the year. If the weevil is a threat earlier in the maturity of alfalfa, treat according to the recommendations in MP144, *Insecticide Recommendations for Arkansas*.

Taking the first cutting early may also allow one extra cutting during the year. Early first cuttings are very apt to be damaged by frequent spring rainfall. However, early cutting enhances yield potential of the second cutting. Second cuttings in late May are less prone to stress by drought than cuttings in June.

Do not harvest alfalfa before the bud stage. Alfalfa root reserves after winter dormancy are at the lowest level when alfalfa is 8 inches tall. Repeated cuttings before bud stage reduce plant density and future yield. Continual defoliation by grazing animals, insects or harvest is likely to do serious damage to the stand.

Subsequent Cuttings

After the first cutting, aim for subsequent cuttings to be made every 30 to 35 days. If possible, irrigate when deficit moisture conditions occur. Beginning in June, the moisture requirements of alfalfa are typically greater than that supplied by rainfall. Irrigation can boost yields.

Drought stunts alfalfa growth and may cause it to yellow or even "burn up." Increasing the harvest interval period is the only alternative during these summer droughts. Reduced yields, drastic yield reductions as well as stand loss may be expected without irrigation.

Final Cutting

Manage alfalfa to build adequate root reserves for winter survival. Don't graze or mow alfalfa during the 30- to 40-day period in the fall immediately before the first killing frost. To help ensure vigorous alfalfa stands for several years, allow the foliage to

transfer nutrients to the roots during the month prior to winter dormancy. This raises the level of carbohydrates in the roots to nearly 40 percent, enough to supply winter root reserves and to support vigorous green-up in the spring.

Innovative Approaches

Several chemicals inhibit mold formation in alfalfa that is baled at moisture content above 18 to 20 percent. When properly applied, preservatives inhibit mold in hay baled with 20 to 30 percent moisture. However, the cost of application, the extra weight at harvest due to moisture and hay settling problems in storage are factors to consider before treating considerable tonnage.

Baling alfalfa at moisture levels above 20 percent reduces leaf loss. This provides better quality hay if a preservative is applied to prevent mold. When using a preservative, spray the alfalfa uniformly as it enters the baler to avoid untreated lumps. A barn fire can start if improperly treated alfalfa is stacked where heat from microbial action on wet portions cannot be dissipated.

Desiccants or drying agents have also been applied to alfalfa at mowing (rather than at baling time) to speed drying time. They accelerate drying, but the cost of application may be prohibitive.

Storage structures and covers are used for round bales. If alfalfa is not harvested to provide hay worth more than $70 a ton, measures other than indoor storage have some merit. The cost of construction and maintenance of hay sheds can be excessive if the quality of hay is low.

When either yield or quality drops, the cost of harvesting equipment makes hay an expensive protein source. In short, proper harvesting equipment and storage facilities can be profitable for alfalfa hay producers, especially when both alfalfa yield and quality are high.

Citations

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