

Managing Alfalfa for Optimum Hay-Stockpiling Production in Montana

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While most crop management practices for maximum alfalfa yield are appropriate for Montana livestock producers, there are several additional management considerations for long-term stands of alfalfa that are used in a hay-stockpile system in order to maximize production efficiency.

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MORE THAN 1.5 MILLION ACRES OF ALFALFA ARE

harvested annually for hay in Montana. Here, alfalfa is grown under a wide diversity of management schemes and climatic conditions (42 percent irrigated vs. 58 percent dry land). Alfalfa can be a very valuable cash hay crop with yields exceeding seven tons per acre in irrigated short-term rotations. However, a vast majority of Montana's hay crop is fed on-site with less than 10 percent produced as a cash crop. The predominant use for alfalfa or alfalfa-grass mixtures for livestock operations is for "hay-stockpiling." This management practice is defined as harvesting dry hay in the summer—one cutting on dryland or two under irrigation—and stockpiling the aftermath regrowth for fall grazing.

Over the last 50 years, much advancement in haymaking has been made, including modern machinery, irrigation equipment, improved crop varieties and better management techniques. These advancements are necessary for maximum production of high-quality alfalfa hay in short-term rotations, and are responsible for our success. However, optimum forage management is different for long-term production and persistence in the hay-stockpiling system practiced by most Montana ranchers. Recent fuel price increases are forcing producers to maintain longer stands, use summer and fall grazing in lieu of haying, reduce deep tillage at stand termination, and adopt a number of other practices commonly used for maximum alfalfa yields. For example, alternative forage crops (primarily cereals) and herbicides have been inserted in alfalfa rotations using reduced tillage methods. Swath, or windrow grazing, is also used as a method to reduce some haying and labor costs. Increasing fertilizer prices are also resulting in reduced applications and production.

In short, there are many new questions about alfalfa management concerning the economics, sustainability and optimum input levels for long-term hay-stockpile production in Montana. Many techniques for maximizing alfalfa yield are appropriate for hay-stockpiling, while others may not be.

Cow-calf and sheep producers' guide for optimum forage production in a hay-stockpile system:

1. Clearly define your annual forage needs in terms of pasture and hay base. Due to our climate, you will always need a supply of hay for one to four months every winter, depending on your location and land base. From your current forage base, consider developing and planting improved pastures to offset your hay needs.
2. Make a clear decision on your labor, equipment and land availability for hay production. Many producers in the 1990s who retired from haying to buy all of their hay were faced with extremely high prices during the drought conditions in 2001 and 2002. In contrast, during years of hay surplus, haying expenses are typically about one half of the crop's value. Forward-contracting hay from a neighbor for a three-year period might be an option. Make a realistic plan for equipment repairs and replacement for the hay you decide to produce.
3. Determine your goals for all new seedings of hay or pasture. For example, consider whether new alfalfa or alfalfa-grass stands will be maintained long-term (eight to 10 years). Consider using these only for hay for three or four years while they are in top production then use them for hay-stockpiling or grazing in later years. Grazing—particularly at inappropriate times—causes rapid stand decline in alfalfa. Bloat is another issue for hay-stockpiling. Mixtures of adapted grasses with sainfoin, birdsfoot trefoil or cicer milkvetch (non-bloating legumes) may be a better option than alfalfa. At any point in your improved forage base, you will have new, highly-productive fields and several older stands with medium to low production.
4. Keep good written records of every hay field and pasture including planting dates, fertilizer rates and dates, yield, grazing or haying dates, stocking level and other relevant facts. It is difficult to make improvements if you cannot remember how old a stand is or when it was last fertilized.

5. When establishing new alfalfa or alfalfa-grass mixtures, follow all recommended practices for top production—this is not the stage to consider cutting corners. When an old alfalfa stand is terminated, we recommend rotation to an alternative crop for two years before returning to alfalfa. Cereal forages, such as hay barley or a winter cereal (wheat, triticale) forage, are very useful to ranchers in this two-year interval. This provides an opportunity to maintain hay production while reducing weed, rodent and pathogen pests in alfalfa, as well as breakdown of sod residues. Soil test and apply P and K ahead of establishing alfalfa. Plant an adapted variety or mixture based on performance data in Montana. Besides alfalfa, there are other adapted legumes (for example, sainfoin and birdsfoot trefoil) and grasses (meadow brome grass and orchardgrass) widely used in mixes. Visit <http://animalrangeextension.montana.edu/Articles/Forage/Main-species.htm> for more information. Use good management strategies, including weed control, irrigation and harvest timing, to develop a vigorous productive forage stand during the establishment year.

6. After establishment, continue to follow good crop and harvest management techniques. For grass, or predominantly grass, stands used in hay or pasture, a major input will be N fertilizer—apply 25 to 30 pounds of actual N per every ton of potential yield. With increases in fertilizer prices, we are anticipating that the use of alfalfa and other forage legumes will increase.

7. Use appropriate harvest or grazing schedules. For cash alfalfa hay, there is an emphasis on early cutting (harvest in the bud stage) for maximum quality. For alfalfa grown in short rotations of three to four years, early and timely cutting will maximize yield and quality. However, most cow-calf producers do not require a large supply of high-quality (for example >20 percent CP, >150 RFV) hay. Often, it is useful to put up some high-quality second cutting alfalfa hay for feeding replacement heifers or bulls. Generally, alfalfa hay cut at the early bloom (<10 percent) stage has the best combination of high yield and good quality for livestock maintenance diets. For long-term, productive alfalfa stands, we recommend cutting alfalfa once or twice prior to early August, then stockpile until October. Haying during this hardening period causes rapid alfalfa stand decline (>20 percent loss in plants) reduced yields (up to 39 percent) and increased weed invasion. For more information, visit this website: (<http://animalrangeextension.montana.edu/Articles/Forage/hay/alfalfaharvest.htm>). If hay or pasture is desperately needed during the critical period, use older fields and do not do it repeatedly—rotate fall use among all of your pastures.

8. Capitalize on your aftermath. After “killing” frosts in October, about one fourth of your annual alfalfa production is available for grazing or haying (see Table 1). In western

Montana, where we routinely produce six-ton alfalfa hay (two to four year-old stands), the aftermath is about 1.5 tons per acre or over three animal unit months (AUM's) per acre (see Table 2). In October, hay is not easily dried so the best uses of the aftermath are pasture or haylage. In October, after the alfalfa is dormant, alfalfa and other forages are more tolerant of grazing. In addition to proper timing of harvest, continue to fertilize and irrigate for good levels of production to optimize the aftermath.

9. Consider using swath grazing rather than direct open grazing to use the aftermath. For crops such as alfalfa, swathing eliminates leaf and nutrient loss, and combined with proper stocking rates, the overall utilization is improved (<http://www.montana.edu/wwwpb/pubs/mt200106.html>). Also, the bloat hazard of swathed alfalfa and clovers decline significantly compared to standing forage.

10. Define the proper time and method to terminate an old stand. Again, this differs between alfalfa grown in short-term cash hay vs. a stockpiling setting. Some cash hay producers use their cost of production figures to determine a kill point. For example, when a stand falls below four tons per acre, it is plowed, regardless of whether it is three or six years old. In a hay-stockpile system, you can use different strategies, such as managing a four-ton stand for hay only until it reaches your pre-determined end point, then incorporate it into your hay-stockpile or pasture base. Under dryland, one to two tons may be your potential, so the kill point may be when weeds have overtaken your pasture. Older stands are likely infested with weeds, such as dandelion, quackgrass Canada thistle, downy brome or others. Be diligent in your grazing and harvests to minimize these weeds from making seed—while you can put up with these in an old pasture, they are costly to eliminate in new stands.

There are many considerations when a stand is to be terminated. Late fall or winter deep plowing was a traditional method of taking out an old alfalfa stand, however you should also consider other lower-cost options. For most forages, the first cut comprises 40 to 70 percent of the total production, so an opportune time to terminate a stand is after first-cut regrowth is vigorously growing. Under irrigation, it is possible to apply herbicide, do light tillage and plant a winter crop for forage in order to save fuel, labor and time in the rotation phase. For the two years that cereals are grown, be sure to fertilize and control weeds before returning to alfalfa and other perennial crops.

In summary, most crop management practices for maximum alfalfa yield are appropriate for Montana livestock producers. However, there are several additional considerations for long-term stands of alfalfa that are used in a hay-stockpile system.

Table 1. Seasonal forage yield distribution (tons of air-dry matter per acre, DM/A) of alfalfa grown under irrigated conditions and best management practices at Bozeman, MT.

	Cut 1	Cut 2	Cut 3	Final cut "Aftermath"	Total
2000 Seeded	6-8-01	7-19-01		10-10-01	
	2.54	1.82		2.15	6.51
% Seasonal:	39	28		33	100
	6-24-02	7-24-02		10-7-02	
	2.58	1.50		1.72	5.80
% Seasonal:	44	26		30	100
2002 Seeded	6-5-03	7-7-2003	8-11-2003*	10-14-03	
	2.05	0.93	1.48	1.08	5.54
% Seasonal:	37	17	27	19	100
	6-17-04	7-24-04		10-14-04	
	2.90	1.84		1.81	6.55
% Seasonal:	44	28		28	100
Long-term Average (1984-2005)	2.50	1.90		1.55	5.95
% Seasonal:	42	32		26	100

*We recommend not cutting or grazing between Aug. 1 and "killing frost" to maximize winter survival and aftermath.

Table 2. Projected alfalfa aftermath production in a hay-stockpiling system.

Target Yield Level	Tons DM/A through Aug. 1		Aftermath (26%)	
(tons DM/A)	(assuming 74%)		(tons DM/A)	AUM/A
2.0	1.48		0.52	1.3
2.5	1.85		0.65	1.6
3.0	2.22		0.78	2.0
3.5	2.59		0.91	2.3
4.0	2.96		1.04	2.6
4.5	3.33		1.17	2.9
5.0	3.70		1.30	3.3
5.5	4.07		1.43	3.6
6.0	4.44		1.56	3.9



<http://www.montana.edu/wwwpb/pubs/mt200511.html>

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