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Producing Maximum Alfalfa Hay Yields and Quality Under Irrigation

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Contents

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An important crop in Idaho's agricultural economy, alfalfa ranks third in value following potatoes and wheat. The rapidly expanding dairy industry has created an increased demand for high quality alfalfa hay, often commanding premium prices. Alfalfa is the most economical source of protein available to Idaho's livestock industry. However, alfalfa probably receives less attention than any crop grown in the state, particularly in irrigated areas. Reduced forage yields and a lower quality forage result from this lack of management.

The increased demand for high quality hay coupled with the increased cost of producing alfalfa have caused most growers to reexamine the importance of production for both maximum yields and premium quality. This publication is designed to help producers increase crop yields and quality of the alfalfa hay grown under irrigation. Proper management can make alfalfa a profitable cash crop as well as a soil-building rotation crop.

Stand Establishment

Site Selection

Alfalfa can be grown under a wide range of environmental conditions. It is best adapted to deep, well-drained soils but will survive on almost all soils except those that are highly alkaline or those that have a high water table. Southern Idaho has ample water, fertile soils and favorable climatic conditions for producing maximum yields of high quality alfalfa hay (Fig. 1).

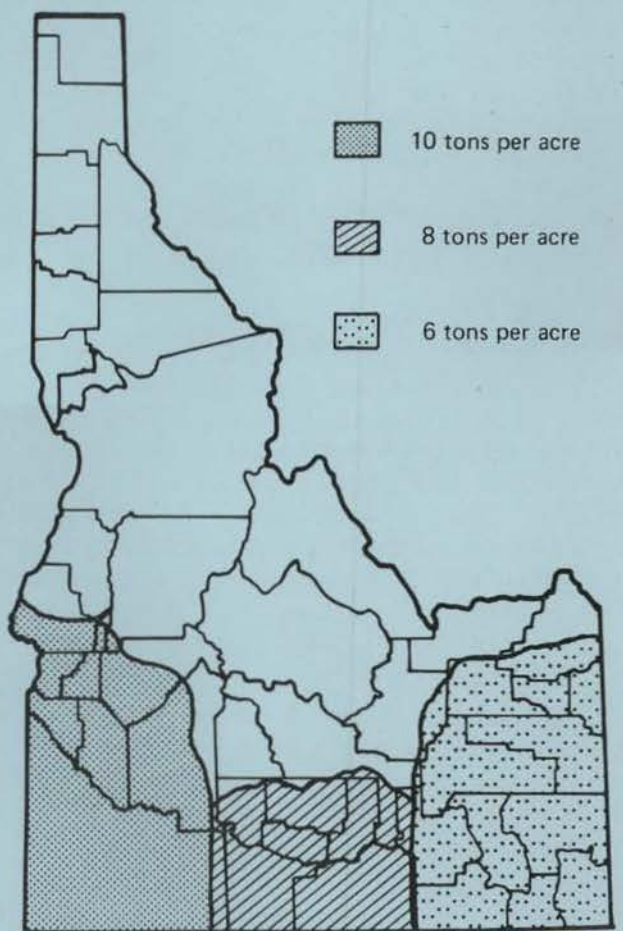

Fig. 1. Potential yield levels of irrigated alfalfa in southern Idaho.

Fertilizer Needs

Growers should complete a soil test before establishing a stand of alfalfa. Alfalfa removes large quantities of nutrients from the soil. Adequate fertilizer, particularly phosphorus and potassium, if needed, should be thoroughly incorporated into the top 4 to 6 inches of soil by plowing or disking during seedbed preparation. Other nutrients that may be lacking include boron, sulfur and zinc.

Nitrogen needs are normally met from the fixation of atmospheric nitrogen by *Rhizobia* bacteria. All new seedings should be carefully inoculated with a high quality, live, rhizobium inoculate. Additions of nitrogen fertilizer are not normally recommended except when soil test readings are extremely low or the stand is established with a small grain companion crop. In such cases, 30 to 40 pounds of nitrogen per acre could be applied. For more information, see University of Idaho CIS 375, *Idaho Fertilizer Guide: Irrigated Alfalfa.*

Seedbed Preparation, Planting Rate and Depth

The seedbed for alfalfa should be firm and well packed. The top one-half to 1 inch of soil should be granular. A firm seedbed will provide good contact between seed and moist soil particles, an important consideration for rapid, uniform germination and early seedling growth. A firm seedbed will also reduce the possibility of planting the seed too deep and will hold moisture closer to the soil's surface.

Seeding rates of 10 to 12 pounds per acre will provide about 50 to 60 seeds per square foot. A thick stand is important for rapid establishment and production of fine stemmed, weed-free, high quality alfalfa hay. Drill the seeds into moist soil with optimum depths varying from one-quarter to one-half inch. Higher seeding rates may be necessary to compensate for poor seedbed preparation or seeding methods.

Seeding Dates

Time of seeding will vary, depending largely upon elevation. Plant as early in the spring as possible so that a good seedbed can be prepared. Be aware of frost hazards.

In areas with long growing seasons, stands may be established in the fall after a grain crop. After the crop residue is removed, the alfalfa can be seeded directly into the stubble. The field should be irrigated immediately after seeding to insure rapid germination. Fall seedings should be made 4 to 6 weeks before the first killing frost (25°F). The alfalfa seedlings will then become well established before the onset of winter.

Weed Control in New Stands

The most important weed-free period for an alfalfa stand is during the establishment period. Alfalfa seedlings which establish without weed competition have increased vigor and longevity. Alfalfa stands established under weed-free conditions produce significantly higher yields than stands established with either cereal nurse crops or with uncontrolled weed populations.[1] The increased yield of weed-free alfalfa stands is measurable up to 3 years after establishment.

Use of good management practices minimizes the influence of weeds on an alfalfa stand and subsequent crop yield and quality. Producers should use all practical weed control tools and not rely on a single type of control.

Good management practices to help minimize weed infestations include:

- Planting certified seed free of weed seed.
- Proper seedbed preparation.
- Controlling weeds in or along irrigation ditches.
- Not spreading manure contaminated with viable weed seed.
- Adapting a herbicide program directed at the weed species present in the individual fields.

Timely tillage operations during seedbed preparation can eliminate a majority of germinating weed seedlings. If ample soil moisture is present, cultivation stimulates seeds of many weed species to germinate. Early tillage operations followed by a thorough mechanical cultivation immediately before seeding alfalfa will destroy the germinating and emerging weed seedlings.

Several preplant or postemergence herbicides are available to protect the alfalfa seedlings during the establishment year. Preplant herbicides such as EPTC (Eptam), benefin (Balan), profluralin (Tolban) and diallate (Avadex) must be thoroughly incorporated into the soil surface (Table 1). A prerequisite for satisfactory weed control with these materials is proper and timely incorporation. Read the label of the herbicide you select for directions on achieving the necessary incorporation.

EPTC is active on both broadleaf weed species and grassy annual weeds, effectively controlling nightshade species (*Solanum* sp.) and quackgrass (*Agropyron repens*) that are often problem weeds during the establishment year. Alfalfa seedlings are quite tolerant to EPTC. Dawson has determined that alfalfa seedlings may exhibit some herbicidal symptoms at use rates of EPTC but that the seedlings will survive rates in excess of 12 lb/acre.[2]

Generally, benefin (Balan) and profluralin (Tolban) are used where grassy annual weeds are a problem. These materials will have sufficient residual activity to provide control throughout the establishment year. Some broadleaf weed species such as redroot pigweed (*Amaranthus retroflexus*) and common lambsquarter (*Chenopodium album*) can be controlled with these compounds. Kochia (*Kochia scoperia*) is becoming a severe problem in many areas of the state and can also be controlled with these herbicides. Prickly lettuce (*Lactuca serriola* L.), cocklebur (*Xanthium pensylvanicum* Wallr.), sunflower (*Helianthus annuus* L.), nightshade (*Solanum* sp.) and the mustards are all quite resistant to benefin and profluralin.

In areas where wild oat (*Avena Fatua*) is a problem, diallate can be used effectively as a preplant incorporated treatment.

[1]Stewart, V. R. 1981. Personal communication. Northwest Agricultural Research Center, Montana State University, Kalispell.

[2]Dawson, J. H. 1981. Selective weed control with EPTC-treated seed of alfalfa. *Weed Science*. 29:105-110.

2,4-DB can be applied as a postemergent treatment to alfalfa seedlings in the 2- to 4-trifoliate leaf stage for broadleaf weed control (Table 1). For best weed control, 2,4-DB should be applied when weed seedlings are no larger than the 2- to 4-leaf stage of growth. Once the weed species have become well established, they are more difficult to kill with this herbicide.

Herbicide treatments are available to be used in crops underseeded to alfalfa. Peas and cereal grain crops are common nurse crops for alfalfa. 2,4-DB can be used in wheat, barley and oats which are underseeded to alfalfa. The application should be made when the cereal crop is in a growth stage in which no herbicidal damage will result. Profluralin (Tolban) can be preplant incorporated where pea fields are underseeded to alfalfa.

A vigorous, uniform stand of alfalfa established under weed-free conditions will provide highest potential yields during subsequent years. To realize maximum profit from alfalfa grown for either seed or hay, growers must first obtain an optimum stand. An investment in an effective weed control program during the establishment year is an insurance policy for high production.

For current information, see University of Idaho MS 44, *Weed Control Handbook*. Consult the Extension county agent in your area or your herbicide dealer for the latest information.

Table 1. Response of weed species to herbicides in alfalfa.[1]

Weeds	Treflan or Tolban	Balan	EPTC	Karmex	Princep	Sinbar	Sencor or Lexone	Kerb	ChemHoe	Furloe G	2,4-DB
Grasses											
barnyardgrass	E	E	E	E	E	E	G	E	E	E	P
downy brome	E	E	G-E	E	E	E	E	E	E	E	P
foxtail	E	E	E	E	E	E	G	E	E	E	P
sandbur	G	G-E	G	G-E	G	G	G	E	-	-	P
volunteer grains	F-G	F-G	G	P-F	G	F-G	P-F	G	E	G	P
wild oats	F	F	G	F	E	-	G-E	F-G	G	G	P
quackgrass	P	P	F-G	P	F	F	P-F	G	P	P	P
Broadleaves (Cruciferae)											
blue mustard	P	P	P	G	E	P	E	F-G	P	P	P
field pennycress	P	P	P	E	E	E	E	G	P	P	E
shepherdspurse	P	P	F-G	E	E	E	E	G	P	P	E
tansy mustard	P	P	P	E	E	E	E	G	P	P	E
tumble mustard	P	P	F-G	E	E	E	E	G	P	P	E
wild mustard	P	P	P	E	E	E	E	G	P	P	E
Broadleaves (Compositae)											
cocklebur	P	P	P	F	F	G	G	P	P	P	G
dandelion	P	P	P	-	F	F-G	F-G	P	P	P	F
prickly lettuce	P	P	P	E	E	E	E	P	P	P	E
sow thistle	P	P	P	G-E	F-G	E	G	P	P	P	G
sunflower	P	P	P	F	F-G	G	F-G	P	P	P	G
Miscellaneous											
chickweed	G	G	G	E	E	E	E	G	G	G	G
dodder	P	P	P	P	P	P	P	F-G	P	G-E	P
knotweed	G	G	F	G	G	E	G	G	P	G	F
kochia	G-E	G-E	P	E	E	G-E	E	F	P	P	G-E
lambsquarters	G-E	G-E	G	E	E	E	E	G	P	P	E
nightshade	P	P	G	-	E	E	P	G	P	P	G
pigweed	G-E	G-E	G	E	E	E	E	P	P	P	E
purselane	G	G	G	E	E	G-E	G	G	P	G	G
Russian thistle	G-E	G	P	G-E	E	G-E	E	G	P	P	E

E - excellent control; G - good control; F - fair control; P - poor or no control.

[1]J. Lish, D. Thill, R. Callihan, R. Brenchley, G. Lee. 1981. Idaho Weed Control Handbook. Misc. Series No. 44. Coop. Ext. Service, Univ. of Idaho. p. 10.

Companion Crops

Alfalfa seeded without a companion crop normally produces the best stands of hay. However, many growers prefer to seed alfalfa in the spring with a companion crop such as grain or peas. Alfalfa seeded with a companion crop sometimes results in thin or spotty stands caused primarily by poor management, crop competition or lodging.

If alfalfa is to be planted with oats, wheat or barley as a companion crop, choose an early maturing, short, stiff-strawed cereal variety that does not lodge readily. Reducing the seeding rate of the grain by 50 percent or plugging every other drill opening to keep the grain rows 12 to 14 inches apart reduces plant competition and allows more light to reach the alfalfa seedlings. If lodging of the small grain companion crop becomes a problem before maturity, the small grain crop should be removed immediately and used as forage. Harvest both grain and straw early and follow immediately with a thorough irrigation. This allows the alfalfa seedlings to become well established for better winter survival and maximum production the following year. Manage the companion crop to benefit the alfalfa seeding.

Alfalfa-Grass Mixtures

Alfalfa for hay production is usually seeded alone. The advantages of seeding an adapted grass (normally orchardgrass or bromegrass) with alfalfa are:

1. An alfalfa-grass mixture may produce higher quality silage than alfalfa alone.
2. A vigorous alfalfa-grass mixture may discourage encroachment of weeds as the alfalfa thins.
3. Alfalfa-grass mixtures may be less likely to cause bloat in livestock grazing the stand.

Disadvantages of planting grass with alfalfa include:

1. Competition may occur during stand establishment between grass and alfalfa seedlings.
2. Grass makes the hay less desirable as a high quality forage, particularly for dairy cattle. Alfalfa-grass hay tends to reduce intake, to be lower in energy and to be generally lower in protein than pure alfalfa hay.

Irrigation

Moisture for the emerging seedlings is restricted to that available at or near the soil's surface. To insure sufficient amounts of water, irrigations should consist of frequent light applications until emergence has occurred. An irrigation before planting is advisable, particularly if soil crusting is a problem.

Lack of sufficient water is the primary reason seedling establishment fails. Moist soil conditions with adequate aeration (below saturation) are optimum for root growth. Be aware, though, that alfalfa seedlings can be injured or killed by prolonged exposure to excessive soil moisture conditions. Water should be applied slowly enough to avoid erosion and excessive runoff yet long enough to moisten the soil through the entire plant root zone.

Variety Selection

Many improved varieties of alfalfa are available for use in Idaho. A thick, dense stand of an adapted, disease-resistant variety must be established to produce high yields of quality hay. When choosing a variety, factors to consider include: winter-hardiness, dormancy, length of time a stand is to be maintained, regrowth rate, disease resistance and insect resistance.

Varieties are classified for winter-hardiness as hardy, moderately hardy and nonhardy. Hardy varieties have sufficient winter-hardiness under most conditions for all crop-producing areas in Idaho. Moderately hardy varieties (generally of Flemish origin) usually have adequate winter-hardiness for the Magic and Treasure valleys and can be used successfully in short-term stands (2 or 3 years) in areas with more severe winter climates. Varieties that are largely nondormant are nonhardy and generally do not perform well in Idaho.

Flemish types of alfalfa have a more vigorous initial spring growth and faster recovery after cutting than the hardy varieties. Planting Flemish types in certain fields and hardy types in others can effectively extend the optimum harvest period by several days, helping to insure harvest of high quality hay even in later harvested fields. This can be particularly useful where large acreages are involved.

The productivity and persistence of an alfalfa stand are closely linked to its ability to withstand both disease and insect pests. When choosing a variety, consider the problems that can occur in your area and select accordingly. Use of high quality, certified seed is very important for stand establishment. For specific information on disease and insect problems that can occur in your area, contact your Extension county agent.

For specific information on alfalfa varieties, see University of Idaho CIS 635, *Alfalfa Variety Performance and Use in Idaho.*

Management of Established Stands For Maximum Yields and Quality

Irrigation

Irrigation frequency and amount of water that should be applied depend on the soil's water holding capacity in the root zone and the rate of moisture removal from the soil. Water consumption is lowest immediately after cutting and greatest at the prebud stage. Water use rates decline after the prebud stage as the plants approach maturity.

Stands should be irrigated before the moisture in the root zone has been depleted below 50 percent of the total available water. Irrigating as close to cutting as possible is important in meeting the needs of the "peak use" period and still have sufficient moisture left to start regrowth.

Insect Control

The alfalfa weevil is the most serious insect pest attacking alfalfa in Idaho. Alfalfa weevil populations, amount of damage and need for control measures vary from year to year. The pea, spotted alfalfa and blue alfalfa aphids can also be problems in alfalfa. Wilting foliage and/or shiny, sticky leaves are signs of heavy aphid populations. See University of Idaho CIS 206, *Controls for Alfalfa Weevil*, for alfalfa weevil and pea aphid control. Other insects that potentially can damage alfalfa include the alfalfa caterpillar, alfalfa looper, cutworms, grasshoppers, spider mites, Western yellow striped armyworm and blister beetles. For recommended control measures, consult your Extension county agent.

Disease Control

Diseases represent a threat of reduced tonnage, quality and stand persistence in alfalfa hay production. The most serious diseases in Idaho include bacterial wilt, stem nematode, root-knot nematode, Verticillium wilt and Phytophthora root rot. Other diseases which are of lesser concern include Fusarium wilt, Fusarium root rot, Sclerotinia crown and stem rot, Rhizoctonia stem blight, leaf spots, downy mildew and several viruses. Disease control is gained primarily through resistant varieties for the more serious diseases and the use of various cultural practices for most of the others. For further information, see the *Alfalfa Analyst* (PNW Bull. No. 129), the *Pacific Northwest Plant Disease Control Handbook* or your Extension county agent.

Weed Control in Established Stands

Weed problems in established stands of alfalfa are often quite different than weed infestations encountered in establishing an alfalfa stand. Winter annual weed species and perennial species often are the major components of the weed population found in alfalfa fields cut for forage. Frequent mowing will help suppress or eliminate summer annual weeds. Weed management practices in previous crops influence the reservoir of weed seed present in the soil and thus the variety of weeds that will be present in the alfalfa stand.

Weeds can result in crop loss in many ways. Reduced production or yield, reduced quality, impaired hay curing and processing, reduced feed value, reduced economic value of alfalfa hay or seed and source of seed for infestations in subsequent crops can result from improper management of an alfalfa field. Losses in Idaho because of weeds have been estimated to be $500 million annually.[3] Unfortunately, the greatest estimated loss occurs in alfalfa produced for hay and seed. In this crop alone, nearly $55 million is lost because of weed competition and the other factors previously mentioned. Crop losses caused by weeds are subtle and may be of little concern to producers. The economic impact of weeds on this industry, however, is greater than any other crop industry in the state.

What can be done to alleviate the problem? Various methods of weed control have been attempted in the past. Mechanical removal of weed seedlings has been a cultural practice in many areas and has met with some success. Rotary hoes and harrows have been employed when weeds are small and before alfalfa breaks dormancy in the spring. However, moderate to severe mechanical damage to the alfalfa crown may allow diseases to enter the plants and reduce the potential productivity and life of the alfalfa stand.

The use of selective herbicides can eliminate the need for mechanical weed control in established alfalfa stands. Thus, crown diseases and disturbance can be minimized.

In recent years, several selective herbicides have been developed which will provide excellent control of broadleaf and grassy weeds. Herbicide selection for your particular situation should be based on the weed species present, the time the alfalfa stand will remain before rotation (herbicide residual), the soil type and pH, the application equipment available and the length of growing season and weather patterns.

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[3]Higgins, R. E. 1978. Economic losses due to weeds in Idaho. Report to the Governor's advisory committee on noxious weeds. Boise, ID.

Alfalfa for Forage or Seed

Several herbicides are available for annual broadleaf and grass control which require fall application when alfalfa is dormant. Dinoseb (Dow General), metribuzin (Lexone or Sencor), simazine (Princep), terbacil (Sinbar) and simazine + paraquat can be applied to the soil surface with no mechanical incorporation required. Winter precipitation aids in placing the herbicide in the zone of weed seed germination or where shallow-rooted annuals feed. Specific weed species controlled by each herbicide are presented in Table 1. See University of Idaho MS 44, *Idaho Weed Control Handbook*, or read the herbicide label for details on harvesting or grazing restrictions, use rates and other limitations.

Trifluralin (Treflan) can be applied to dormant alfalfa but requires mechanical incorporation. Equipment should be used to minimize damage to the crowns of established alfalfa stands.

EPTC (Eptam) can be applied to established alfalfa stands before weed seeds germinate in the spring. The herbicide is metered into irrigation water. Alfalfa plants and weeds that have started to grow are unaffected by EPTC. See the label for specific application directions.

2,4-DB can be used as a postemergence treatment for annual broadleaf weed control in established alfalfa stands. Small weeds are most susceptible to this treatment. Effective control is obtained when broadleaf weeds are no more than 3 inches high or when rosettes are no more than 3 inches across. Adequate soil moisture must be available at the time 2,4-DB is applied.

Propham (ChemHoe) is an effective treatment for annual grass control. Applications should be made in mid-winter or early spring to control most annual grasses, including wild oats and volunteer grain. For specific information, see Table 1.

Perennial grasses such as quackgrass and Kentucky bluegrass can invade and severely reduce the productivity of the alfalfa stand. Pronamide (Kerb) can be applied in late fall or early winter before soil freezes but after alfalfa is dormant. This herbicide will also control annual grass species. For details on application rates and restrictions, see the herbicide label.

Dodder continues to be a major problem in several areas of the state. CIPC (Furloe) can be used to control this parasitic weed in alfalfa to be used for forage or as seed. The herbicide should be applied uniformly to the soil surface before germination of the dodder seed. Best results have been obtained when CIPC is applied to wet soils after rain or irrigation.

Alfalfa for Seed Only

Diuron (Karmex) can be applied in the fall to dormant alfalfa. This herbicide needs moisture to get the best results. Read the label for restrictions of applications in problem soil areas, soil type and soil organic matter levels.

Pronamide (Kerb) and DCPA (Dacthal) are registered for dodder control in alfalfa grown for seed only. These herbicides must be applied before dodder seed germination in the spring. Read the labels for details for use.

Fertilizer Needs

A soil test will help estimate the fertilizer needs of your soil. Established alfalfa stands can be top-dressed with phosphorus and potassium. Fall fertilizer applications are recommended on established stands for best results. For more information, see University of Idaho CIS 375, *Idaho Fertilizer Guide: Irrigated Alfalfa.*

Harvesting Top Yields of High Quality Hay

Time of Harvest

Harvesting at an early stage of maturity produces the maximum yield of quality forage. Determine the optimum time for cutting by stage of plant growth.

The most satisfactory general guide for optimum harvest time is to cut between late bud and first flower. However, cool spring weather may delay flowering. The appearance of new growth at the crown, under these conditions, indicates the proper time of harvest. Weather and growing conditions vary from year to year, making harvest scheduling by the calendar unreliable.

Research has shown that early cutting of an adapted variety will not adversely affect persistence of the stand or yields obtained. When comparing total yields of early cutting vs. cutting at later stages of maturity (i.e., full flower), research data have shown comparable to slightly higher yields obtained from early cutting. First cutting yields will be slightly lower with early cutting compared to late cutting. However, second and third cutting yields will normally be higher.

Fall Management

Alfalfa should not be forgotten and abused as fall approaches. Stresses such as drought and nutrient deficiencies should be avoided. Established stands should not be grazed when muddy nor should livestock be allowed to overwinter on alfalfa fields. Such practices result in soil compaction and crown injury, favoring disease development. Any of these stresses can adversely affect winter survival or spring recovery of an alfalfa stand, reducing vigor and productiveness of the stand in succeeding growing seasons.

In areas such as eastern Idaho where winters are more severe than the Magic and Treasure valleys, the final cutting should occur about 30 days before the first killing frost. This allows the alfalfa time to store sufficient carbohydrate reserves for better winter survival. The regrowth may be harvested after a killing frost, if desired.

Harvest

Most growers prefer to cut hay with a swather equipped with a conditioner that crushes or crimps the alfalfa stems. This shortens the drying time by one-half to two-thirds, allowing the crop to be baled and removed from the field sooner. Less time in the field reduces potential damage from unfavorable weather and encourages faster recovery.

Hay should be baled when moisture content is between 16 to 20 percent. Baling hay when excessively dry (less than 16 percent) causes increased leaf loss, resulting in reduced yield and quality. At moisture levels above 20 percent, losses can occur from heating and mold. Use of a bale moisture tester will insure baling at optimum moisture levels.

Forage Quality and Animal Performance

Alfalfa hay quality is important to Idaho's dairy and livestock industry. Alfalfa hay supplies the major share of feed nutrients in nearly all ruminant rations. Fig. 2 illustrates changes in yield, digestibility and feeding values that occur with advancing maturity of alfalfa. The decrease in feeding value that occurs with advancing maturity means less meat or milk produced per acre of alfalfa harvested.

Digestibility and Palatability

Digestibility and palatability of alfalfa hays are related to the difference between feed intake and fecal dry matter loss. Digestibility of the forage declines about one-half of a percent each day cutting is delayed past early bloom. In addition, palatability decreases rapidly with advancing maturity. To maintain optimal animal performance with hay cut at later maturities, expensive concentrate substitutions must be made to offset declining alfalfa digestibility and intake. This means greater ration costs and reduced profits to the animal feeder.

Crude Protein

Alfalfa is an especially important source of crude protein in livestock rations. Crude protein content decreases rapidly in alfalfa with advancing maturity. Lower crude protein levels associated with later maturity result from a decrease in the leaf to stem ration. Percentages of leaves decrease after early bloom while the percentages of stems and the fiber content increase. The cost of crude protein derived from common protein supplements is generally more than crude protein from alfalfa hay. This results in more costly rations to livestock producers.

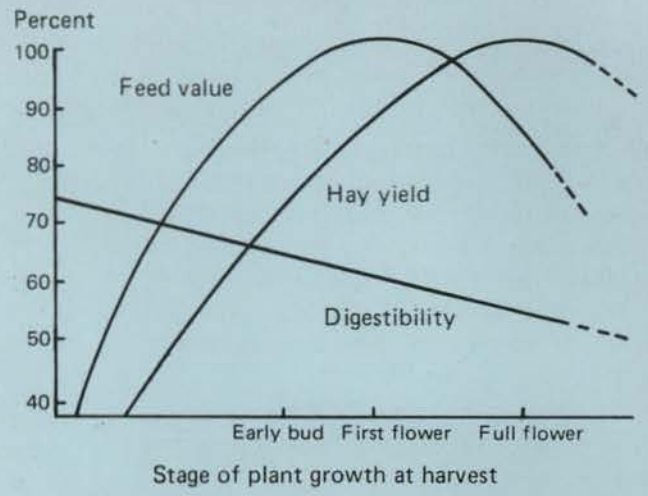

Fig. 2. Effects of advancing maturity on the feed value, yield and digestibility of alfalfa hay.

Fiber and Minerals

When alfalfa matures, mineral content decreases and fiber content increases. Phosphorus content can be reduced from 0.26 to 0.20 percent from first bloom to full bloom alfalfa. Increased fiber content with advancing maturity reduces digestibility, palatability and total animal intake. Animals perform best when fed alfalfa which is low in fiber, high in protein and rich in minerals.

Determining a Price for Alfalfa Feeds

Alfalfa is a key ingredient to nearly all dairy and livestock rations. It is harvested, stored and fed as dry hay, silage and green chop. As indicated earlier, the nutrients can be quite variable. This variability of nutrients and moisture content of the different forms means the dollar value is also quite variable.

The alfalfa producer wants to sell his crop for the highest value. The buyer wants to purchase feeds to meet animal requirements at the least cost.

The selling price of an alfalfa crop should be determined by the buyer and seller. This applies to dry hay, silage or green chop. The most important factor to consider is the crop's moisture content. Crude protein content is the second factor to consider. Other factors that can be considered would be fiber, energy and minerals. University of Idaho CIS 539, *Setting a Price for Alfalfa Feeds*, details guidelines for adjusting alfalfa feeds based upon moisture and protein content variation.

Alfalfa Production Cost

Cost and return budgets for alfalfa production are available for the major producing areas of Idaho. These budgets, calculated by the Idaho Budget Generator, show costs per acre range from a low of $72.08 for dryland hay in eastern Idaho to a high of $355.10 for irrigated production in south-central Idaho. The state average is $275.11. These figures include all cash or variable costs (water, fertilizer, fuel, repairs and labor) as well as fixed costs (depreciation, taxes and interest on investment). Irrigation by sprinkler was assumed for most areas. Land was included at $1,500 per acre and 8 percent interest. No charge was made for management; therefore, net income (gross income-total cost/acre) is the return to management and risk.

Table 2 indicates the effect of increased yield on the cost per ton (using a production cost of $275.11 per acre) and net returns when hay sells for $60 per ton. Table 3 shows net returns to management and risk when yield and price per ton are varied, again using a production cost per acre of $275.11. Maximizing production of quality hay means higher returns and can make alfalfa a favorable cash crop. For more localized information on the cost of production, contact your Extension county agent.

Table 2. Effect of yield on per ton costs and returns.

	Yield per acre					
	3	4	5	6	7	8
Cost/ton	91.70	68.76	55.02	45.85	39.30	34.39
Net/ton	-31.70	-8.76	4.98	14.15	20.70	25.61

Table 3. Sensitivity of returns to risk and management to changes in price and/or yield.

Yield/acre (tons)	Price/ton					
	50	60	70	80	90	100
3	-125.11	-95.11	-65.11	-35.11	-5.11	24.89
4	-75.11	-35.11	4.89	44.89	84.89	124.89
5	-25.11	24.89	74.89	124.89	174.89	224.89
6	24.89	84.89	144.89	204.89	264.89	324.89
7	74.89	144.89	214.89	284.89	354.89	424.89
8	124.89	204.89	284.89	364.89	444.89	524.89

Other College of Agriculture publications on alfalfa production and weed control you will want to get are:

MS	44	Idaho Weed Control Handbook	$1.00
PNW	129	Alfalfa Analyst	.50
CIS	206	Controls for Alfalfa Weevil	.10
CIS	375	Idaho Fertilizer Guide: Irrigated Alfalfa	.05
CIS	539	Setting a Price for Alfalfa Feeds	.10
CIS	635	Alfalfa Variety Performance and Use in Idaho	.10

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