Alfalfa Yield and Quality Influenced by Management Practices

- Harvesting alfalfa at mature growth stages generally increases yield potential but usually results in a lower quality product.
- Focusing on just obtaining high yields or only targeting maximum alfalfa quality can reduce stand persistence and shorten the life of the stand.
- Each ton of alfalfa dry matter removes about 14 pounds of phosphate ($P_2O_5$), and 58 pounds of potash ($K_2O$).

Quality versus Yield Decision
Alfalfa yield and quality are inversely related in the plant’s growth cycle (Figure 1). Cutting alfalfa at later plant maturities can increase yield potential, but results in lower overall quality due to the increase in stem yield relative to leaf yield. Conversely, harvesting alfalfa at mid-vegetative growth stages typically produces a higher quality forage, but usually results in lower yield.

The procedure is called PEAQ (Predictive Equations for Alfalfa Quality) and uses alfalfa stand height and maturity stage to estimate RFQ. After measuring the tallest and most mature plant in a 2 ft² area, producers can use a specially designed PEAQ “measuring stick” available from some seed companies or a PEAQ RFQ table to determine standing alfalfa RFQ levels. The PEAQ procedure is most appropriate for good stands of pure alfalfa with healthy growth.

PEAQ tables providing RFQ estimates may be available at your local county extension office. In addition, the PEAQ sampling procedure and RFQ tables for standing forage is available on-line from the University of Wisconsin at http://www.uwex.edu/ces/forage/pubs/rfq-peaq.html

In general, it is recommended to harvest alfalfa at about 150 RFQ for milking dairy herds and 125 RFQ for heifers, stocker cattle, and lactating beef cattle. First crop alfalfa standing in the field can drop 3 to 5 points of RFQ per day. Therefore, a one-week delay of first crop harvest could cost at least 20 RFQ points in feed quality.

While PEAQ provides an estimate of standing crop quality in the field, adjustments should be made for harvest loss. Under the best conditions, 10 to 20% of the forage dry matter will be lost at harvest. This loss equals about 15 RFQ units for haylage, and about 25 RFQ units for hay. Therefore, to end up with 150 RFQ alfalfa, it is recommended to harvest when PEAQ measurements predict 165 to 175 RFQ for standing alfalfa.

Nutrient Requirements
Each ton of alfalfa dry matter removes about 14 pounds of phosphate ($P_2O_5$), 58 pounds of potash ($K_2O$), 30 pounds of calcium, 6 pounds of magnesium, and 6 pounds of sulfur. A current soil test should be used to determine existing soil nutrient levels, especially pH, phosphorus (P), and potassium (K) to avoid future over or under fertilizer applications. Soil tests are the most reliable method to prevent future nutrient deficiencies which can decrease alfalfa yield potential and quality.

Visual plant symptoms may indicate nutrient deficiencies; however, by that time, significant yield losses have already occurred. Symptoms may also be caused by other factors such as environmental conditions, diseases, restricted root growth, or other problems not related to nutrient deficiencies. To confirm symptoms are nutrient related a plant tissue analysis may be needed.
Harvest Schedules
Alfalfa stand persistence and stand life may be reduced by focusing on just obtaining high yields or only targeting maximum alfalfa quality. Some degree of balance is needed to preserve the stand and permit it to reach its potential. Scheduling harvest of the first two cuttings is critical to maximize yield of high quality alfalfa. Rapid changes in forage quality can occur during this time period and delayed cutting can reduce quality. For high yield and high quality, the first cutting should be taken at bud stage; generally mid- to late-May in northern areas and earlier farther south. The second cutting should be taken 28-33 days after the first cut, or at mid-bud stage, whichever is earlier. After that, a subsequent cutting should take place 38-55 days later or at 10-25% bloom. Letting the stand mature a bit longer before the third cutting can build up root reserves and boost stand persistence. The forage quality of alfalfa does not change as rapidly in later cuttings compared to earlier cuttings; therefore, later cuttings maintain quality to later maturity changes. In the fall, alfalfa stands need a break from harvest during the 6 to 8 weeks prior to the killing frost. In northern areas, this timeframe is roughly the first of September through mid-October and later in more southern regions. This rest period allows plants to build up adequate reserves of carbohydrates in the roots before winter begins. If plants are cut during this rest period, it will not only reduce the speed of regrowth the next season, but can reduce yield potential of the first cutting. Also, the practice can even cause the stand to thin. Waiting and making a final cutting after the first hard freeze (24 °F or lower) may hurt alfalfa and may help reduce pest problems. For example, Minnesota researchers found that the highest yields came from three cuttings during the growing season with a late-fall cutting.4

Reduce Storage Losses
During storage, hay is subject to dry matter and quality losses. Losses are minimal for hay stored inside a building at proper moisture content. However, losses can rise sharply if moisture content exceeds 20% for inside-stored hay and losses may be much larger from uncovered bales stored outside under adverse conditions.8

When storing round bales outside consider the following practices to reduce dry matter losses and decline in quality.8

- As bale density increases, outside storage losses generally decrease. A minimum density of 10 lbs/cubic foot is recommended for round bales stored outside.
- Hay/soil contact is a primary source of spoilage and if possible should be eliminated. Consider placing bales on crushed rock, a concrete pad, or some other object such as wooden pallets.
- If stored on the ground, water should drain away from bales. Storing bales near the top of a slope reduces the amount of water flowing around them. Bale rows should run up and down a slope with a north/south orientation; a southern exposure is desired.
- Flat ends of bales should be butted tightly together but the rounded areas should not touch. At least 3 feet of space should be left between rows to allow for air circulation, unless rows are placed together to facilitate covering with plastic or other material.
- Store hay in a sunny location, preferably in an area where frequent breezes occur. Hay should not be stored under trees or other areas where drying may be slow.

Sources
Web sources verified 05/02/16 160127094901.051416DLB

For additional agronomic information, please contact your local seed representative. Individual results may vary, and performance may vary from location to location and from year to year. Individual results may vary, and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible. ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. All other trademarks are the property of their respective owners. ©2016 Monsanto Company. 160127094901.051416DLB