

What to Look for in Evaluating Hay

Evaluating hays can teach you a great deal about factors that affect the feeding value of hays as well as the defects that are likely to appear. Top quality hay is associated with high protein and high total digestible nutrients (TDN) contents. The quality of forage fed to livestock determines how far you can cut expensive concentrates to minimize costs and maximize profits. Livestock feeders seeking high profits consider good quality forage the basis of any livestock ration because essential nutrients not supplied by the forage must be supplemented by expensive concentrates.

Hay varies more in quality than any other harvested feed crop grown on American farms. There is a wide difference in the quality of hay, even within a single species grown in the same locality and under almost identical conditions. This variation is due largely to lack of understanding of the fundamentals of good haymaking and to a tendency among farmers to give less attention to their

hay crop than to other cash crops such as wheat and potatoes. Hay buyers will frequently find both excellent and poor quality hays offered at the same price. Substantial savings in the cost of producing livestock and livestock products could be made on most farms by feeding more high quality hay and less grain per animal unit.

How to evaluate hay quality

Hay should be evaluated for characteristics that will affect its value as feed. *Quality in hay really means feed value.* The factors known to influence hay quality and animal performance are stage of maturity, leafiness, color, foreign material, and the odor and condition.

Stage of maturity. This refers to the growth stage of a plant at the time that it is harvested. The stage of maturity of legumes and grasses can be easily identified before they are cut, but after the hay is cut and cured it is more difficult. Weathering or sun-bleaching of the hay or delay of the normal development of the flower parts of legumes because of weather conditions complicates the determination of stage of maturity even more.

The stage of maturity at which alfalfa was cut is determined by observing the condition of the bloom and the texture and woodiness of the stems. Alfalfa cut in the bud stage can be recognized by the size of buds at the tips of the stems and by the absence of the purple flower petals. Bud-stage alfalfa also is usually very leafy and the stems are relatively fine and pliable. Alfalfa cut in the early bloom stages has some purple flower petals and stems that are larger than in bud-stage alfalfa. Alfalfa hay that is cut after it has blossomed has distinctly larger, woody stems, fewer leaves, and a rather stemmy appearance. Alfalfa cut after the full-bloom stage is usually indicated by the large stems, by the presence of seed pods, and by a deficiency of leaves. Alfalfa blooms profusely under certain conditions and sparingly under others, making determination of the exact stage of maturity by the number of blossoms somewhat difficult.

The stage of maturity of clover can be determined by observing the color and condition of bloom and the maturity of the seeds, if any are



present. Clover that was cut no later than the full bloom stage will have numerous heads that show the red or purplish-red blossoms of the red clover, or the pinkish-white or white blossoms of white and subterranean clovers, provided the hay was not weathered while being cured. Clover cut in the full bloom stage will have no seeds, or at most, only a few shrunken ones. A stage between full bloom and full maturity is indicated by the brown color of all the clover heads and the presence of yellowish-brown seeds. Full maturity is indicated by the dark-brown color of the heads and the presence of plump, mature seeds. The first crop of clover often does not produce seed, which will account for the absence of seed in hay that has other appearances of being late-cut. Clovers should be cut at the one-fourth to one-half bloom stage for top quality hay.

The stage of maturity at which grasses were cut for hay can be determined easily by examining the heads. First-cutting orchardgrass, reed canarygrass, and tall fescue should have been cut in the boot (head is emerging from the leaf roll) to early heading stage. First-cutting timothy, perennial ryegrass, and smooth brome grass should have been cut in the early to medium heading stage. If these grasses were cut before full bloom, no ripe seeds will be present and parts of the flower can be seen. Full maturity is shown by the plump brown seeds that shell out easily from the whitish dry glumes or chaff. The stage of maturity of grasses is also related to green color. Even if not weather damaged, grasses with fully ripe seeds usually have yellowish-brown stems and heads and many brown leaves.

Alfalfa-grass mixtures should be cut according to the maturity of the alfalfa; that is, when the alfalfa is in the late-bud to early-bloom stage. Clover-grass mixtures should generally be cut according to the maturity of the grass.

Leafiness. The amount of leaves in relation to stems is a more critical factor with legumes than with grasses, because legumes lose their leaves more readily than grasses during curing and handling. Leafiness is extremely important since two-thirds of the protein is found in the leaves.

Leafiness will depend upon the stage of plant maturity. As plants mature, the stems become larger, lower leaves fall from the plant, and the proportion of leaves decreases. Since leaves are high in protein and low in fiber, highest quality hay is that cut in the late-bud to early-bloom stage when plants have a high proportion of leaves.

Leaf shatter during raking and baling is another major cause of reduced quality. This leaf loss is greater as maturity increases. The method of curing, the method of handling the hay from field to storage, and weather conditions during curing and baling also influence leafiness. It must be emphasized that hay must be cut early and carefully cured and handled in order to save leaves.

Leafiness in alfalfa hay, for example, may vary from 65 or 70 percent for very leafy hay, to only 10 or 15 percent for very stemmy hay. A bale of very leafy alfalfa hay has an appearance in which the leaves predominate and cling to the stems. The stems are soft and pliable. Hay that has been so cured and handled that the leaves cling to the stems usually has pliable stems. On the other hand, alfalfa hay which has a low percentage of leaves will appear very stemmy in the bale.

When leaves are off the stems and are loose in the bales, the hay is likely to lose feed value through waste when the bales are opened for feeding.

Color. This is another definite indication of hay feed value. The most desirable color approaches the bright green of the immature crop in the field. This color usually indicates that the hay was cut at an early stage of maturity and well cured. The fresh aroma (odor), freedom from must or mold, and a relatively high carotene content add to its palatability and feed value.

The bright green color in hay may be lost by bleaching in the sun, rain during curing, fermentation in the bale, stack, or mow, or because the plants were too mature when cut. Sun bleaching reduces the palatability of hay. Rain will leach a large portion of the plant nutrients.

The appearance of bleached hay will tell much about the cutting and handling methods:

- Sun bleached hay has a *light golden yellow* color and need not be discriminated against as seriously as hay which has been rained on or which has heated in the stack. Only material on the outside of the window or only the sides of the bale exposed to the direct sunlight, will be bleached. The other material should be a bright green.

- Hay which has been exposed to rain or to heavy fog and dews has a characteristic *dark brown or black* discolored appearance. The stems of hay that has been bleached too long in the sun or that has been discolored by rain are usually harsh and brittle.

- *Brown* colored hay indicates heating and fermentation caused by storage at too high moisture. This hay usually has a distinctive musty odor and the bale is often caked.

- *Yellowing*, especially in grass hay, usually indicates that the plants were over-mature when cut. This can be distinguished from sun bleaching in that all plants will have the same yellowish color.

Slight discolorations from sun bleach, dew, or moderate fermentation are not as serious as the loss of green color from maturity, rain damage, or excessive fermentation.



Foreign material. These materials can be divided into non-injurious and injurious. Non-injurious foreign material means those kinds of matter in hay that are commonly wasted in feeding operations, but are not harmful to livestock if eaten. This includes weeds, so-called wire grasses, overripe grain hay, grain straw, corn stalks, stubble, chaff, sticks, and any other objectionable matter. Some grasses, such as wild rye, most annual brome grasses such as cheat and chess, pigeon grass (sometimes called foxtail or wild millet), broomsedge, and needlegrasses from which the needles have fallen, are considered as foreign material when mature.

Material that is poisonous or will harm the animal when eaten is considered injurious foreign material. This includes sandburs, poisonous plants such as tansy ragwort, harsh or rough bearded grasses like mature foxtail, wild barley, 3-awn grass, or ripgut brome, and grasses that have a sharp point at the base of the seed such as matured needlegrasses with the needles attached. It also includes any other matter such as wire or nails. Hay containing injurious foreign material should not be purchased. In a judging contest, a sample containing injurious material should be placed at the bottom of the class.

Weeds are the most common non-injurious foreign material found in hay. They are usually not relished by the livestock and when eaten have little or no feed value. Hay containing weeds or other foreign material is discriminated against on the market because weeds represent waste and give the hay a bad appearance. Weed seeds usually pass through the animal undigested; when the manure is spread on land, it becomes a source of weed infestation.

Odor and condition. The smell of new mown hay is the standard for comparisons. Mildew, mustiness or a putrid (rotten) odor indicates lowered quality and are caused from storage at too high moisture or weather damage. Odor problems usually result in lower acceptability by livestock.

Attention should also be given to the condition of the hay. It should be free from must and mold and from insect and disease damage. It also should not be dusty.

Visual evaluation of hay based upon factors influencing quality

The sample score sheet below can be used as a guideline for visually evaluating hay. The score sheet indicates the amount of importance to place upon each factor. You will note that stage of maturity is the most important factor, with 30 points being allocated to that factor. Leafiness, color, and odor and condition each receive a possible 20 points, while foreign material has a possible 10 points.

SAMPLE SCORE SHEET

| | Possible score | Score given |
|--|----------------|-------------|
| Stage of maturity | 30 | |
| Alfalfa should be cut in the late bud or early bloom stage, clovers at one-fourth to one-half bloom. Most grasses should be cut in the boot to early heading stage. These stages of maturity score highest (25 to 30 points). Alfalfa and clovers cut at the full bloom stage or grasses cut between the late heading and full bloom stages score low because they have lower feed value (1 to 10 points). | | |
| Leafiness | 20 | |
| Hay with a high ratio of leaves to stems and with a high proportion of the leaves attached scores high (15 to 20 points). Stemmy hay and hay with leaves shattered scores low (0 to 5 points). | | |
| Color | 20 | |
| Hay with a bright green color scores high (15 to 20 points). Golden yellow to yellow colored hays score 5 to 15 points. Dark brown or black colored hays score 0 to 5 points. | | |
| Foreign material | 10 | |
| Hay with non-injurious foreign material should receive a lower score than that without (0 to 10 points). Hay with injurious foreign material should be disqualified and placed at the bottom of the class with no score. | | |
| Odor and condition | 20 | |
| Smell of new mown hay scores high (15 to 20 points). Hays with musty or other off-odors score 5 to 15 points. Moldy or unusually dusty hays are scored very low (0 to 5 points). | | |
| TOTAL | 100 | |

Characteristics of excellent, good, fair, and poor quality hays

Excellent quality. Legumes cut in the late bud to early bloom stage for alfalfa or one-fourth to one-half bloom stage for clovers; grasses cut in the boot stage. Leafy, bright green color and free from mold or mustiness. High in carotene, protein, minerals, and energy; low in fiber.

Good quality. Legumes cut by one-half bloom; grasses cut in the early heading stage. Leafy, good green color and free from mold or mustiness. Hay that is rained on after partly cured can fall into this category if it was cut early. The nutritional value is not as high as excellent quality but good results can be obtained when properly supplemented.

Fair quality. Legumes or grasses cut at full bloom. Lacks green color, stemmy, low in carotene, minerals, protein, and energy. High in fiber.

Poor quality. Any legume or grass cut after full bloom. Severely weather damaged, bleached, stemmy, lacking leaves, musty, or moldy.

Using your hay evaluation skills to determine the hay inventory for your farm

The physical characteristics previously described should indicate to you that there is a wide variation in the potential feeding value of hay. You can use your hay evaluation skills to estimate the quality of the hay that you are feeding to your livestock. You may be surprised to learn that the quality of the hay being fed is better than you originally thought, and you can reduce the amount of concentrate feed. On the other hand, you may find that the quality of the hay is poorer than you thought, and you may need to increase the amount of concentrate feed.

The figures in the following table illustrate one way of taking inventory of the forage supply on your farm.

Factors for converting hays of varying quality into equivalent amounts of good hay

| Hay quality | Physical characteristics | Conversion factor |
|-------------|--|-------------------|
| Excellent | Very early cut, leafy, bright green | 1.2 |
| Good | Early cut, leafy, green | 1.0 |
| Fair | Medium to late cut, without excessive damage or loss of leaves | 0.8 |
| Poor | Late cut, coarse, stemmy, unpalatable | 0.6 |

Example: You have 60 tons of fair quality hay, 40 tons of good quality hay, and 20 tons of excellent quality hay. How many tons of hay do you have in equivalents of good quality hay?

$$60 \times 0.8 = 48$$

$$40 \times 1.0 = 40$$

$$20 \times 1.2 = 24$$

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Total = 112 tons in terms of potential feeding values instead of 120 tons

The 120 tons of hay you have represents only 112 tons of hay in terms of its potential feeding value. In actual feeding, animals will eat less of the fair quality hay when compared with good quality, therefore, the lower conversion factor. When fed excellent quality hay, animals may eat more of it. But even if they ate the same amount, the feed nutrients contained in the excellent quality hay will result in better animal production and performance than if the animal is fed lower quality hay.

Summary

Hay quality generally means the same as feed value. Five basic factors are known to influence hay quality and animal performance, the most important of which is stage of maturity. Top quality hay is cut early, is leafy, has a bright green color, and is free from foreign material, mustiness, or mold.

The importance of developing skills in evaluating hay quality is not to win a judging contest, but rather to be a wise livestock feeder. Remember that the quality of the hay fed to your livestock determines how far you can cut down on the feeding of expensive concentrates and thus boost your profits. If you buy hay, your hay evaluation skills will be helpful in making wise buying decisions. If you can find both excellent and poor quality hays for the same price, knowing which is the higher quality feed can save you money.

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