

UPDATING THE OFFICIAL U. S. STANDARDS  
FOR HAY AND STRAW

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It has been estimated that in 1979, close to 140 million tons of hay will be produced in the United States. Approximately 20% (28 million tons) of this will be sold off the farm. The value of all hay produced in the three year U. S. Agricultural Census average of 1975 through 1977 ranked third behind corn and soybeans at approximately 6.8 billion dollars. Hay cash sales ranked seventh in value of crops produced at close to 1.4 billion dollars. Hay production and marketing is definitely big business. This has been reflected by the movement of hay and forage products in both national and international markets. Movement has been increasing, and all indications are that it will continue to do so in the future.

Occasionally, in the hay marketing process, an official inspection is requested in order to certify a lot of hay for class, quality, and condition. Hay and straw inspections are authorized by the Agricultural Marketing Act of 1946, and are performed according to the Official U. S. Standards for Hay and Straw.

The Official U. S. Standards for Hay and Straw now in use were written in 1933 and revised slightly in 1949. It has been recognized over the years that the standards, especially for grading of hay, have a number of deficiencies and problems which hinder their use. Some of the major problems associated with the standards are:

1. Number of grades. There are approximately 312 possible grades in the present standards for hay and straw, making them difficult to interpret.
2. Grading procedure. The entire grading procedure is based on subjective determinations involving the senses of sight, smell, and touch. This results in the potential for grading variations.
3. Feed value determinations. The present grading systems do not accurately indicate the true feed value of the hay. Even though factors such as leafiness, color, foreign material, etc. give an idea as to quality, true feeding value can only be determined by laboratory analysis.
4. Classification system. Many grasses and legumes not named in the present standards are being grown and harvested for hay. The present classification system, which contains a few grasses and legumes, is completely outdated in this respect.
5. New hay making techniques. There is no way to grade or indicate quality of hay cubes, pellets, wafers, or big bales according to the present standards. Laboratory analysis is essentially the only method for determining quality of cubes, pellets, or wafers.

In order to refine and correct the deficiencies in the present hay standards, and to a lesser extent, the straw standards, a suggested revision was initiated by the Hay Marketing Task Force of the American Forage and Grassland Council. This Task Force was made up of representatives of the American Forage and Grassland Council, the hay industry, and government. Their aim was to look at the changes and needs of the expanding hay market, and to focus more attention on the potential of hay as a cash crop. It was agreed that one of the fundamental hay marketing problems of today is determining hay price by some realistic measure of feed value, and that any revision should include nutrient quality factors.

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The suggested hay and straw standards revision initiated by the Hay Marketing Task Force was submitted to the Marketing Standards Branch of the Federal Grain Inspection Service for further development. Study drafts which simplified the grading system and integrated feed value determinations for hay were formulated and distributed for comment. The first four study drafts were based on a numerical grading system for grass, legume, and mixed hay. However, it was the consensus of many individuals who commented on these drafts that the use of numerical grades for hay, especially with the inclusion of nutrient quality analysis factors, seemed to compound the problem of determining a fair and accurate grade for all classes of hay. A major problem associated with the grading of hay is its characteristic of not being a static commodity. Many variations can occur between and within plant species and within a lot of hay itself due to:

Physiological variations.

2. Soil conditions.
3. Fertilization
4. Hay making methods.
5. Other environmental factors

What may be a fair grading system for one plant family or species may not be for another. Grouping plants into a broad base for numerical grading is not accurate, especially for grasses. Some grasses, and even legumes, are slightly lower in quality than others, but still have a high use efficiency in a certain area or for a particular animal. Examples of these include the use of sub-tropical grasses or mature timothy as commonly fed hay. The more or less system of grading hay was just too fine a line to be fair and accurate. Also, the grading and certification of pellets, wafers, or cubes was excluded by this system.

To establish more equitable standards, the numerical grading system was eliminated in the fifth draft, and a factorial analysis system was initiated. This factorial analysis has been more readily accepted by members of the hay producing and marketing industry. The factorial system of analysis only states facts. It is not biased to one plant family or species, and eliminates the unfairness of grouping.

In the present study draft, hay is defined as the harvested, unthreshed herbage of forage plants, with a moisture content of 25 percent or less, is not coarse or woody, contains less than 20 percent foreign material, and meets the definition of either legume, grass, or mixed hay. If an inspection is requested, a lot of hay would be classed as grass, legume, or mixed; and a subclass would be assigned, depending on the plant species in the lot. From then on, any further analysis would be completely optional (Table 1). In contrast to the draft revision, the present hay standards have a total of eleven different classes or groups, and set a limit of 35% for moisture content and foreign material.

As a quality analysis tool, the factorial system retained most of the subjective factors from the present hay standards, but added laboratory test determinations for a more efficient evaluation of quality and nutrient content. The subjective properties include:

1. Stage of maturity.
2. Color.
3. Leafiness.
4. Foreign material.
5. Injurious foreign material

6. Weeds and plants undesirable on agricultural land.

Pertinent remarks - moldy, sour, etc.

The laboratory determinations include

Color - instrument value.

2. Moisture percentage.
3. Crude protein determination.
4. Neutral-detergent fiber (NDF) - which indicates total cell wall content, and is highly correlated to voluntary intake.
5. Acid-detergent fiber (ADF) - which indicates the indigestible portion of the cell wall to the ruminant animal. This is highly correlated to dry matter digestibility.
6. Relative feed value (RFV) - which is an estimate of overall forage quality. Digestible dry matter intake (DDMI) is calculated from the NDF and ADF values, and RFV is calculated from this.
7. Total digestible nutrients - which indicates energy availability from the proteins, carbohydrates, and fats.

As stated, the portion of the analysis containing the subjective and laboratory determinations would be completely optional. None, any, or all of the factors could be included in the inspection. This would be entirely at the discretion of the individual calling for the inspection.

To obtain any or all of the laboratory determinations on a lot of hay, a representative sample, composited from core samples, would be sent to a private or university laboratory proficient in performing the quality determinations. Research is being carried out to adapt near infrared reflectance (NIR) analysis to measure forage quality. This would provide a means for quick, accurate analysis of crude protein, NDF, and ADF content. Included in the NIR research is a project at six federal laboratories to study the effects of species difference, growing environment, fertility, years, maturity, preservation, and sample handling on NIR analysis of hay. If a change in the standards is initiated, it is hoped that NIR machines could be placed in agricultural extension offices, hay marketing centers, or other points accessible to the hay producers and marketers. These machines would be connected to a central computer which would give quality analysis results in approximately two minutes. Researchers are confident these machines can be perfected to accurately analyze hay. However, the machine price is now quite high, making it prohibitive at the local level.

Even though the factorial analysis system is seemingly the method of choice for indicating hay quality, revision of the hay standards has been and still is a sensitive issue to many hay producers and marketers. Many individuals feel a change in the standards is long overdue; others feel a change is a waste of time. There, also, has been a wide variety of opinions on exactly what and how much things should be changed. A great many of the hay producers today have never had their forages analyzed for nutritional quality, and are skeptical as to the use and value of these determinations. Naturally, this presents a problem in promoting acceptance.

Unfortunately, there have also been a few misconceptions rumored concerning the standards revision. The major misconception is that the U. S. Government will require mandatory inspections on all interstate and export hay shipments. This is a complete fallacy. Hay and straw inspection is authorized by the Agricultural Marketing Act of 1946, which states, "...no person shall be required to use the service..." All hay and straw inspections will be performed on a voluntary basis, regardless of whether or not a standards change is made.

There are a number of problems still present which need further study and possible refinement. These include: method and cost, particularly for chemical or NIR quality analysis; availability of qualified inspectors; rapid quality analysis determinations;

and proper sampling techniques. Even with all problems corrected, there is no guarantee that a change would instantly and greatly facilitate the marketing of hay. However, it would offer a fair, unbiased method for hay quality determination, and make available an analysis system which could be used to determine hay market price by some realistic measure of feeding value.

The Federal Grain Inspection Service solicits and welcomes all comments on the possible proposed standards change. A request for Public Comment concerning the possible development of or change in a number of federal standards, including hay and straw, will soon be published in the Federal Register. The purpose of the Register is to distribute information, such as a possible change in the standards, and to solicit suggestions and comments from interested parties. Copies of the Federal Register are usually sent to libraries and to interested parties who could be affected by a standards change, such as industry, farm organizations, state and federal offices, etc. I urge you to obtain a copy of the Federal Register article and make known any comments or suggestions concerning the possible hay and straw standards change. Constructive opinions and criticisms are the backbone for developing standards which are beneficial and useful to all concerned.

FOR DISCUSSION PURPOSES ONLY

TABLE 1 -- FACTOR ANALYSIS SHEET FOR POSSIBLE PROPOSED HAY STANDARDS

Requirement and Certification

a. Hay shall be classed into the categories: U. S. Legume Hay, U. S. Grass Hay, and U. S. Mixed Hay; the inspection certificate, unless otherwise noted, shall state any or all of the following quality factors:

Class: U. S. \_\_\_\_\_ Hay

Subclass: (Species) \_\_\_\_\_

Factors:

Color: (Visual observation) \_\_\_\_\_

Color: (Instrument value) \_\_\_\_\_

Leaves: (Percent by weight) \_\_\_\_\_

Foreign Material: (Percent) \_\_\_\_\_

Injurious Foreign Material: \_\_\_\_\_

Moisture: \_\_\_\_\_

Crude Protein: \_\_\_\_\_

(Percent) \_\_\_\_\_

(Percent) \_\_\_\_\_

Relative Feed Value (RFV): \_\_\_\_\_

Total Digestible Nutrients (TDN): (Percent) \_\_\_\_\_

Remarks: Moldy ; Musty ; Dusty ; Sour ; Sweet

Treated with a Preservative ; Other: \_\_\_\_\_

b. Samples will be certificated for the factors inspected or requested.