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HAY MAKING: KEY TECHNIQUES AND METHODS FOR FORAGE PRESERVATION

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Hay is preserved forage with a moisture content of less than 15%, allowing it to be stored safely without the risk of fermentation or mold. Although most forages can be stored as haylage, the nutritional value of haylage varies significantly depending on the type of plant used.

Hay making is a common and straightforward method for preserving seasonal surpluses of green fodder and is the primary technique for preserving farm by-products. The key principle in hay making is to reduce the moisture content of the herbage to a level where it can be safely stored in bulk without undergoing fermentation or becoming moldy. The main types of hay used in livestock feeding are legume hay, non-legume hay, and mixed hay.

Crops Suitable for Hay Making

- Thin stemmed cereal crops like sorghum, oat, reage grasses, range legumes particularly sylosanthes, Siretro, cowpea, lablab, and all the cultivated legume fodders like berseem, lucerne, and cowpea are suitable for hay making.
- Leguminous forages have high buffering action and high nitrogen content, and hence are more suitable to be conveniently conserved as hay.
- Cultivated fodders like hybrid napier, para grass, guinea grass, teosinte are not suitable for hay making.

Hay Making Methods

There are three methods of hay making. They are field curing, barn drying, and artificial drying.

1. Field Curing: As the name indicates, cut plants are cured in the field itself to make hay. The various steps in this process are:

(i) Cutting the crop: Any type of power or hand cutting may be used. It is highly desirable to cut in the same direction. The crop is left there itself in the swath to dry partially.

(ii) Swath curing: Hay is dried much more rapidly in the swath than in the windrow. Therefore maximum advantage of swath curing may be taken to speed up the operations. But after a certain degree of curing, there will be shattering and bleaching of leaves reducing the nutritive value of hay considerably. The forage should be left to cure in the swath until it is wilted sufficiently but before there is danger of shattering and loss of carotene due to bleaching action of sun. No definite time can be assigned to swath curing but at this time the moisture is roughly 40%.

(iii) Raking: After wilting forage to about 40% moisture in the swath, it is rolled into small loose fluffy cylindrical bundles known as windrow. It is better to do raking in the morning as dew makes the hay a little more tough and prevent shattering.

(iv)Cocking: This is the process of making bigger heaps after hay has been cured partially in windrows. Cocks are even protected with hay caps where rain is expected. If there is labour shortage this step may be discarded. Under such circumstances hay is completely cured in the windrow. However, cocking is advisable as it will give better hay with more carotene content.

(v) Baling and storing: Pick-up baling directly from windrow is the most automated system where the baler attached to tractor picks up hay in the form of windrows and bale it. Where such machines are not available hay may be stored as loose bundles in hay stacks.

2. Mow Curing (Barn Drying)

This refers to the practice of curing partially dried hay inside the barns in mows. Heated or unheated air is blown on to the mows until the moisture is reduced to 20-25%. Swath curing is completed in the field itself and when the moisture is 35-40%, it is taken into the barns and placed on the mows. It takes 7-14 days on the mows with unheated air to cure the hay fully. With heated air it takes less time. Generally the hay produced in this manner will be greener and leafier and of a higher quality than field cured hay.

3. Dehydration or Artificial Drying

This is the process of chopping freshly cut or wilted fodder and drying it in artificial driers. This is limited to large commercial operations where alfalfa meal or alfalfa leaf meal for use chiefly as a vitamin supplement for poultry and swine are produced. Such hay is consistently of superior quality.

Losses of Nutrients in Hay Making

The losses in nutritive value in hay making are:

1 Losses of leaves by shattering;
2. Losses of vitamins due to bleaching (oxidation) and fermentation;
3. Losses of soluble nutrients by leaching in heavy rain

1. Losses by shattering: The loss due to shattering of leaves and finer parts in hay making is of importance, especially in the case of legumes. The leaves are much richer in digestible nutrients than the stem and hence losses by shattering decrease the nutritive value of hay. To avoid these losses, hay should never be overdried or handled during warm periods of the day. Handling of hay, while field curing, is preferably done in the morning hours of the day.

2. Losses of vitamins due to oxidation: In the process of drying, much of the green colouring matter containing carotene (provitamin A) is bleached. Exposure of the green plants to sun rays decreases vitamin A content of the hay. Sun cured hays are rich in vitamin D_2 (ergocalciferol).

3. Losses due to fermentation: After the crop is harvested the plant enzymes act on the soluble carbohydrates forming thereby CO_2 and water. Therefore, in a normal hay making process some of the nutrients are lost. This loss results in the higher crude fibre content of dry matter of hay as compared to the green fodder. In addition to carbohydrates, protein is affected. Proteins are hydrolysed to amino acids which will be lost if there is rain on the hay due to leaching. In normal curing there is a loss, about 5-9% of dry matter.

4. Losses due to leaching: If hay is almost cured and is exposed to heavy and prolonged rains, especially when it is in the field, severe losses may occur through leaching. Unless the rain is so heavy as to soak the material, losses by leaching will not occur and the losses will be much less even in heavy rains if the hay is in good sized windrows. Leaching causes loss of protein, soluble carbohydrates and other soluble nutrients.

Total losses in Hay Making

Loss of dry matter	20-30% in legumes and 10-15% in grasses
Loss of protein	28%
Loss of carotene	90%
Loss of energy	25%

Brown Hay

The optimum moisture level for safe storage of hay is 12-14% under tropical Indian conditions. If hay is stored with moisture more than this, fermentation takes place and the hay may become very hot and turn brown. Such hay is often quite unpalatable and less nutritious. Starches are broken down to sugars and alcohol and a type of hay called 'Mow- burnt hay' is obtained. Sometimes hay stacks may catch fire spontaneously due to excess fermentation and heat. Therefore a moisture level of 12-14% is important before stacking.

Advantages of Hay Making

1. It is most suitable method of conservation of green fodder for small holder.
2. Less expensive to prepare a high quality conserved from of feed.
3. It is possible to maintain more stock on a certain area of land.
4. Many undesirable things present in a fresh crop are eliminated after it is converted into hay.

Disadvantages of Hay Making

1. In making hay from high-quality forage, the biggest drawback is the loss of valuable leaves in handling.
2. Some nutrients are always lost in field curing of hay.
3. Drying of green forages at ordinary temperature reduces its digestibility.
4. Loss of vitamins due to bleaching and fermentation.

Conclusion

Hay making is a critical process in agricultural practices, ensuring a reliable and nutritious feed supply for livestock, especially during times when fresh pasture is not available. By meticulously applying these techniques, farmers can significantly enhance the quality and longevity of their forage, ultimately supporting the health and productivity of

their livestock. The success of hay making relies on a deep understanding of these practices, ensuring that the forage retains its nutritional value and remains free from spoilage throughout storage.

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