Good Ensiling Depends On Variety Of Factors

Editor's Note: Part 2 of 3 on the silage making process is reprinted with permission from International Silo Association.

Comments Of The Ensiling Process

In looking at the normal ensiling process, there a number of related points that should be kept in mind.

1. Timeliness. Success of failure in silage making is determined largely by the events which occur during the first few days after storage. The type and degree of microbial activity, and thus the end product, are influenced by moisture, temperature, oxygen supply, and available energy.

2. Fast Filling. Proper and efficient ensiling is achieved by the quick disappearance of oxygen from the silage mass. This controls the extent of the temperature rise and encourages the anaerobic or true fermentation phase to start before there is any appreciable loss of plant energy.

3. Moisture. Ensiling a crop with a moisture content of 50-70% aids in developing a well-packed mass that minimizes both the amount of entrapped air and also the amount of subsequent air that can enter from outside.

4. Anaerobic. To obtain quality silage, anaerobic conditions should be reached as quickly as possible (within 1-3 days) to prevent undesirable microbial activity from taking place, and with it excessive heat buildup and nutritional loss. The length of time it takes to reach the end of the aerobic phase depends on such factors as silo type, fineness of chop, distribution and packing, etc. Anaerobic conditions inhibit plant respiration as well as the development of molds and yeast during the first days of storage. Yeasts and molds compete with desirable acid-producing bacteria for WSC in the plant material, resulting in high dry matter losses and lower quality silage.

5. High Organic Acid. The more rapid the development of a high organic acid concentration, the lower will be the losses that occur during fermentation (i.e. less time for spoilage organisms to operate, less growth of yeasts, etc.). The rapidity of attaining the final pH depends on temperature, moisture content, WSC concentration, protein content, and oxygen infiltration.

6. Fermentation. In the ensiling process, it is important to achieve complete fermentation — i.e. high production of organic acids (particularly lactic) and the resulting low pH level. Sufficient lactic acid will only be produced if a good supply of WSC are available in the ensiling mass.

7. Plant Sugars. The amount of WSC of plant sugars available for fermentation is governed by a number of factors such as plant species and dry matter content. WSC are readily available in corn, somewhat less in grasses, and, particularly in more northern latitudes, considerably less in legumes. At higher moisture levels, the WSC concentration is lower. One of the benefits of wilting the hay crop before ensiling is to concentrate the WSC, thereby providing more energy for lactic acid.

8. Management. There are a number of management practices which influence the sugar content of haycrop forage and thus the results of fermentation. Some of these include fertilization, plant maturity at time of cutting, length of wilting period, prevention of rain damage, and achieving rapid anaerobic conditions on ensiling.

9. Hay Silage. Alfalfa is one of the most difficult materials to ensile. In addition to being low in sugars, it is high in proteins and minerals which tend to act as buffering agents that neutralize the acids and prevent a drop in pH.

10. Clostrida. One of the undesirable acid-forming bacteria present in silage is clostridia, which forms an odorous acid called butyric. These bacteria become active as a secondary fermentation process in ensiling material where the moisture content is high (more than 70%), and where the pH is higher than normal. This type of fermentation is more prevalent in silages that are relatively low in WSC. If the moisture content is high, this dilutes the WSC and adds to the problem. The result is the clostridia bacteria become active, consuming both plant material (WSC and proteins) and the lactic acid produced by the lactobacilli. This latter action reduces the silage protection. In addition to the production of odorous such as butyric acid, clostridia fermentation produces wasteful by-products such as carbon dioxide and ammonia. The resulting silage is of lower nutritional value, not as readily accepted by the livestock, and if fed, will result in poor intake and poor performance. Clostridia activity can be reduced by lowering the moisture of the material to be ensiled and encouraging fast lactic acid buildup by following good silage-making practices.

11. High Moisture Hay Silage. Clostridial fermentation can be a particular problem with high moisture content haylage (especially legumes), where large quantities of lactic acid are required to lower the pH to a point where clostridia will be inhibited. As well, the high buffering action of legumes means that even more lactic acid is required to reduce the pH of the silage. In addition, this type of plant material may not have enough WSC available for the lactobacilli to produce sufficient lactic acid.

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MEADVILLE (Crawford Co.) — John Mark Hunter, formerly of Washington, recently began his duties as vice president for branch operations with PennWest Farm Credit, ACA (Agricultural Credit Association).

Hunter is responsible for the management of operations and credit for the two branch offices servicing Erie, Crawford, Warren, Venango, and Forest counties.

Hunter was raised on a southwest Washington County dairy farm. He began his career with Farm Credit after earning his degree in business administration from West Liberty State College, West Liberty, W. Va. He served as field representative, loan officer, and branch manager in the Washington Branch prior to his current promotion.