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Agronomics with livestock in mind!



WHAT THE SMELLS FROM SILAGES CAN TELL YOU

You can gain valuable insights into the inner workings of the silage bunker through the smells given off by the silage. Different smells can leave clues as to what is actually happening within the silage. It can also provide you with tips regarding certain problems that may be occurring during the silage fermentation process.

Dr. Limin Kung, noted for his research of silages and preservation, shares the following advice on what can be learned from these silage smells and what they might mean to a dairy operation.

Sweet-smelling silage is not always an indicator of the best fermentation because the sweet smell is probably coming from high concentrations of alcohols produced by spoilage yeast and undesirable bacteria. High concentrations of alcohols are commonly found in both high-moisture corn and corn silage, and are usually associated with a significant amount of dry matter loss. These silages are also very likely to heat when exposed to air in the silo, bunker or feedbunk.

In contrast, foul smelling silage is a pretty good indicator that something has gone wrong. There are several foul odors you may encounter in silages. First, the butyric acid smell – which smells like baby vomit – is common in grass and alfalfa silages that are high in moisture content. This acid is produced by bacteria called *Clostridia*. In addition, these silages may also smell fishy and ammonia-like because of the excessive breakdown of protein and resulting formation of compounds known as polyamines.

You probably will never smell these odors in silages if the dry matter content is greater than 35 to 40 percent because *Clostridia* do not grow well in dry silages. Ironically, silages with high butyric acid content are very stable when exposed to air and will not overheat, but are also characterized by large losses in dry matter, high ammonia and soluble protein content, poor digestion, and low energy. Consumption of large quantities of silage with a high concentration of butyric acid may also sometimes lead to subclinical ketosis.

Another foul smell is the musty/moldy odor that comes when silages have undergone aerobic spoilage, which smells like rotten socks. Excessive amounts of air (as a result of poor packing, poor covering, slow feedout rate, or poor face management) lead to an explosion of spoilage yeasts that is then followed by rapid growth of molds and spoilage bacteria. Moldy silages should not be fed to cows. Sometimes, but not always, this silage may have high concentrations of mycotoxins. Silages that smell

moldy are usually hot and steamy (or have gone through a heat). Feeding aerobically spoiled silage can also lead to depressed intakes and production.

Sometimes silages have a very sharp smell of vinegar. Vinegar is the common name for acetic acid, which is an end product of many organisms that are active in silage fermentation. Extremely wet corn silages often have high concentrations of acetic acid. In the past, silages that were high in acetic acid because of uncontrolled fermentation were considered undesirable because there was some evidence that such silages depressed intake. Research shows, however, that silages inoculated with the *Lactobacillus buchneri* undergo a “controlled” acetic acid fermentation to help improve aerobic stability and when fed, they do not depress intake. Other preservatives may also provide the same results (check out Biotal products offered by Renaissance).

A mildly sweet tobacco/molasses smell in corn silage is a definite indicator of heat-damaged protein. In all silages, when this smell is noticed you can be sure of excessive heating. These silages should be tested for bound nitrogen, also known as unavailable nitrogen or acid-detergent insoluble nitrogen (ADIN), and the protein requirements should be adjusted in the ration accordingly.

In some silage, a nail polish-like smell may be present. Compounds like phenyl-acetic acid may be responsible for this smell. To date, researchers are unsure of the significance of this odor in silage.

Arguably, the best silage fermentation – called homolactic acid fermentation - should have little or no distinct smell because the dominant acid produced in this process (lactic acid) has almost no smell. Silage should be wilted to the correct moisture, chopped to the correct length, and silos/bags/bunkers filled quickly, packed tightly and sealed promptly.

Good silage has a positive impact on productivity and profitability. What is planted and how it is harvested and preserved – are critical to the end results. Smell the silages on farms! It might make a difference.

(edited from an article by Mycogen, Fall 2005)

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