

“reconstitute” dry grain before feeding. This, of course, adds extra handling costs.

To take full advantage of early harvest and high moisture grain feeding, farmers have looked for better ways to store wet grain. High moisture grain can be stored by either of two methods. It can be ensiled in storage or acid treated before being placed in storage. In either case the kernel moisture of the grain should be relatively high. For ensiled corn the moisture content (wet basis) should range from 25 to 30% with 28% being ideal. The outside limits are from 23 to 35% moisture content. If corn is in the 18 to 23% moisture content range, it is very difficult to store except in special storage structures. This is the range where spontaneous combustion is likely to occur if the grain is not ensiled, dried, or treated.

Preserving high moisture grains with chemicals has some unique advantages over other grain storing and handling methods. It also has some drawbacks, which will be addressed below. Acid-treated grain can be stored at a lower moisture content than ensiled grain. The range for acid-treated grain is from 18 to 27% moisture content.

Another aspect of storing high moisture grain is the space required. Wet grain takes more storage space than dry grain. For example, 30% moisture content corn requires 1.41 cubic feet per bushel, and dry corn at 15.5% moisture content requires 1.25 cubic feet per bushel. Only about 88% as much high moisture shell corn can be stored in the same volume as dry corn.

The principle behind the storage of high moisture grain is a low pH, whether it is stored as ensiled grain or as acid-treated grain. Low pH means that the acidity has been increased in the grain to prevent growth of molds or certain microorganisms. By definition pH indicates a measure of the acidity of a solution. The range in acidity is from a low of 1 which is extremely acid to a high of 14 which is very basic or alkaline. Pure water has a pH of 7 which is considered neutral. Therefore, water is neither alkaline nor acid. The pH for high moisture grain storage should range from about 3.8 to 5, preferably closer to 3.8. A low pH in grains, as mentioned above, can be obtained by either of two ways: (1) fermentation, which causes a low pH to occur naturally in the stored grain, or (2) adding acid, which causes increased acidity to occur artificially as the grain goes into storage.

Ensiling Process

The ensiling process is a method of obtaining fermentation which in turn increases acidity. Essentially this occurs in three phases. The first phase is marked by the reduction of respiration within the grain cells. Respiration will continue until nearly all oxygen in the storage has been