1. **What is the best type of fermentation in a silo?**
   The best type of fermentation is a homolactic fermentation because the recoveries of dry matter and energy are the highest. The high ratio of lactate to acetate in silage is better than a low ratio. Good silages will also have less than 0.1% (DM basis) butyric acid. In these silages, fermentation has occurred quickly to preserve nutrients. Microbial inoculants that supply at least 100,000 cfu/g of silage and based on homolactic acid bacteria may improve silage fermentation by increasing dry matter recovery and increasing milk production.

2. **Is it possible to over inoculate with homolactic bacteria?**
   Yes. In some instances, too much of a good thing can result in fermentation products that have poor antifungal properties. (Lactic acid by itself is not very antifungal). Such silages undergo a rapid, initial fermentation but when exposed to air they heat extremely rapidly because yeasts degrade lactic acid and result in heating and DM losses.

3. **Can a homolactic acid type of fermentation improve aerobic stability?**
   Yes. A new inoculant based on 3 strains of homolactic acid bacteria was released in the U.S. last year. The bacteria in this inoculant were selected for their ability to prevent the growth of spoilage yeasts in corn silage. In addition, a new heterolactic acid bacteria, *Lactobacillus buchneri*, has resulted in dramatic improvements in reducing spoilage.

4. **Are there instances when a heterolactic fermentation may be better than homolactic fermentation?**
   Yes. In a new inoculant has been improved for sale in the US. It is a heterolactic acid bacteria (*Lactobacillus buchneri*) that converts some of the lactic acid in silage to acetic acid (Ranjit and Kung, 2000; J. Dairy Sci) which lowers the numbers of spoilage yeasts and dramatically improved aerobic stability.

5. **What else can be done to improve aerobic stability?**
   Sizing silos to match a rapid feed out rate is important. Wilting to the correct moisture content for the appropriate silo, packing silos well, quickly, and sealing are very important. Good face management during the removal of silage can also minimize spoilage. Buffered propionic acid based products (2 to 4 lb/ton) are also
6. **What is the recommended density of silage in bunker silos?**

The best way to compare silo densities is to convert the findings to a dry matter (DM) basis. Muck and Holmes (1999) measured the density of silage in over 160 bunk silos of alfalfa and corn silage. The average densities found are shown below. Recommended densities are a **minimum** of 14 lb of DM per ft$^3$. Measurements should be made at a standardized depth in the bunk silo (6-7 ft below the surface).

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Alfalfa silage (87 silos)</th>
<th>Corn silage (81 silos)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry matter, %</td>
<td>42</td>
<td>34</td>
</tr>
<tr>
<td>Wet density, lb/ft$^3$</td>
<td>37</td>
<td>43</td>
</tr>
<tr>
<td>Dry density, lb/ft$^3$</td>
<td>14.8</td>
<td>14.5</td>
</tr>
</tbody>
</table>


7. **How fast should I fill my bunker silos?**

Fill in a progressive wedge design (see below). Pack no more than 6-8 inches of forage at a time. Packing speed can be calculated using an Excel sheet from the University of Wisconsin at the following web location: [http://www.uwex.edu/ces/crops/uwforage/storage.htm](http://www.uwex.edu/ces/crops/uwforage/storage.htm) (page down to the section on Storage Sizing and Management (silage) and find the fact sheet entitled “BUNKER SILO DENSITY CALCULATOR”).

8. **How much silage must I remove from the face of a silo per day to prevent spoilage?**
On average, most recommend removing a minimum of 6 inches of silage from the face of the silo each day. More is recommended in hot weather or if silage is dry. Remove silage from the face down rather than from the bottom up to minimize air from penetrating into the silage mass. Clean and feed all loose silage as soon as possible. Plan to remove more than 6 inches per day if your silage is dry or if the silage was not well packed, or if it fermented very slowly.

9. **What is the minimum thickness of plastic to cover a silo?**
   If you plan to use all the silage within 3 to 4 months, 4 mil thickness is adequate. If you plan to keep silage longer, seal with a plastic that is 6 mil thick. Weigh the plastic down with tires (touching) or cover with soil. Be sure to remove the soil and do not let this mix with good silage before feeding.

10. **When is the best time to cut alfalfa for maximizing sugar content in the plant?**
    Several factors affect the sugar content of the plant. Sugars are highest after the plant has been active in photosynthesis (bright sunlight). On cloudy days, the sugar content of the plant will be low. A quick dry down is desirable because the longer the plant is wet, the more respiration occur, which results in lowered sugar content. Raking can increase the rate of dry down. The best compromise is to cut in the late morning and allow the plant to dry quickly to prevent respiration. This is better than to cut the plant with a higher sugar content in late day only to have the sugars lost during respiration during the evening. Delays in silo filling and sealing will also decrease the sugar content of the plant. If you do not intend to pack the chopped material immediately, do not chop it!

11. **Is it advisable to add molasses as a source of sugar to silages to improve fermentation and animal production?**
    There is some evidence that adding molasses (at least 40-50 lb/ton) may alter silage fermentation. In general, if soluble sugars are limiting, the addition of molasses may increase the extent of fermentation (e.g. lower pH and more acids produced). However, the addition of molasses does not always improve the quality of the fermentation. That is, addition of molasses may not make the fermentation more homolactic. In fact, some research suggests that adding molasses will stimulate a more heterolactic acid fermentation, which is less desirable. There is also no evidence that supports improved animal performance when animals are fed silage treated with molasses. Two other major problems with the addition of molasses is the inability of obtain an even distribution (this is especially difficult in a bunk silo) and the fact that residual sugars could lead to poor aerobic stability during feedout because yeasts (which cause heating) can consume the molasses and convert it to alcohol. In my experience, I feel that there are very few instances when molasses is needed as an additive for corn or alfalfa silages.

12. **When forage is too dry, will the addition of water help?**
When forage is dry, the addition of water may help in fermentation but the amount of water that must be added to make a difference is substantial. For example, in order to decrease the DM% of a tonne of forage that is 50% to 44%, one must add about 300 lb of water. To further reduce the DM to about 40% requires about 495 lb of water. Another problem with addition of water is that this water may not completely absorb into the forage mass and may actually increase the amount of runoff. Water should be used only in the worst conditions. Instead, use a liquid based microbial inoculant to stimulate the fermentation.

13. **Is the addition of grains (corn or sorghum) useful for making silage.**
In general, the addition of grains to silage is not recommended. Although grains contain large amounts of starch, lactic acid bacteria that ferment silage cannot use starch as an energy source. The only instances when the addition of grains has sometimes helped in fermentation is in extremely wet silages (> 75 moisture) where they have acted as absorbents. Residual starch may also make the silage heat more rapidly.

14. **What is the effect of frost damage on corn silage?**
In general, a mild frost will not damage the corn plant. A killing frost (below –3C for several hours) will kill the entire plant. If the corn plant is immature, it will also probably be higher in moisture than optimal recommendations for harvest. It is best to measure the whole plant moisture with a microwave because even though the leaves dry down, the stalk retains a significant amount of moisture. Allow the corn plant to dry to the desired dry matter percent before harvest. The drying rate of immature corn will be the same as regular corn. In contrast, a killing frost on mature corn will cause the drying rate to be faster. In both instances, monitoring moisture and targeting whole plant DM of 33 to 37% is recommended. If silage is too dry, chop length can be slightly decreased to improve packing but attention must be paid to balancing effective fiber in the total mixed ration.

15. **Is it better to feed alfalfa green chop, hay or silage?**
This is a difficult question to answer. In general, intake of green chop or dry hay will generally be greater than silage. However, silage is often the desired forage source because it is more easily managed in a total mixed ration. Green chop can be used successfully if it is limited to not more than 50% of the forage dry matter. The important factor in using any of these forages is consistency of the diet and gradually making any dietary changes.

16. **How long should silage be stored before it is fed?**
Most recommendations suggest that forage should be ensiled for a minimum of 3-4 weeks before being fed. However, in circumstances when fermentation is very slow, silage may need 6 weeks of storage or longer before feeding. I have seen extremely large bunk silos that took 2 to 3 weeks to fill with fermentation that lasted more than 2 months before ending. Again, a key to managing forage is make gradual changes.
17. **What should I do in a drought situation?**

Be sure to measure the whole plant DM content before ensiling. Corn plants can look very dry but retain a significant amount of water in their stalks. Don’t guess!!! In most instances, whole plant DM will be the driving factor for harvest. Try to shoot for 35% DM for the whole corn plant.

- In severe instances, because nitrates accumulate in the bottom portion of the plant, raise the cutter bar and leave about 10-12 inches of stalk in the field. Harvest during the afternoon on a warm and sunny day (nitrate levels tend to be lowest under these conditions).
- Ensiling will decrease nitrate levels by about 50 to 60%. Allow silage to ferment for at least 3-4 weeks prior to feeding and gradually introduce new silage to animals.

*Silage additives:*

- **Buffered propionic acid-based preservatives:** Silage additives based on buffered propionic acid may be appropriate for drought stressed forage especially if the DM% of the whole plant is greater than 38 - 40%. Addition of 2-4 lb./ton of such products per ton of wet forage can improve aerobic stability of the silage and reduce DM losses in the silo and during feedout. Although this may seem costly, such preservation easily pays for itself by preventing drops in intake and milk production that would occur if cows were fed spoiled silage.
- **Homolactic acid bacteria (microbial inoculants):** Severely drought stressed corn forage may contain lower numbers of naturally occurring lactic acid bacteria. Thus, homolactic acid bacteria may be useful if the DM% is low (high in moisture) or is within the normal range.
- **Sugars:** Drought stressed corn forage usually has high concentrations of fermentable sugars and because the buffering capacity is low, the addition of molasses, or other fermentable substrate, is usually not warranted.

18. **What if the weather is too wet and wilting and harvesting become difficult?**

When the weather does not permit adequate wilting for alfalfa, risk of a clostridial-fermentation increases. Use of an inoculant to speed up the fermentation can help to drive a better fermentation. Your goal should still be to strive for harvesting the forage as close as possible to the optimal stage of maturity.

19. **What happens when silage looks like it did not ferment?**

Sometimes after opening a silo, the forage does not look like it fermented. To find out what has happened, measure the pH of the forage. If the pH is low (< 4.5), but the silage looks green and fresh, a rapid homolactic fermentation probably took place. (Lactic acid has no smell) If the pH is high (> 5.0) then the forage has probably not fermented. Reasons for this may be harvesting under cool conditions, harvesting after a frost, or lack of sugars. Gradually adapt cows to silage that has not been fully ensiled to prevent acidosis.

20. **How do I deal with a very unpalatable (not poor quality) silage?**
If possible, try to remove all of the questionable silage from the diet for 10 to 14 days. Then slowly add the silage back into the diet (mixed well) in small, but increasing amounts over the next two weeks. Adding some molasses to the TMR may also help.

21. **Why is it that some big bale silages with relatively high DM contents (>40-50%) still appear to have a clostridial fermentation?**
In wrapped bale silage, moisture often condenses and moves through the bale depending on exposure to the sun and environmental temperatures. This causes moisture to “pocket”, resulting in small microenvironments where clostridia can survive.