QUESTIONS AND ANSWERS ON *LACTOBACILLUS BUCHNERI* 40788, A NEW MICROBIAL INOCULANT THAT IMPROVES THE AEROBIC STABILITY OF SILAGES

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1. **What is aerobic stability?**
   "Aerobic stability" describes the ability of a silage to remain stable (and not spoil) when exposed to air. A simple method to measure aerobic stability is to expose silage to air and measure the generation of heat. Heat is produced from spoilage organisms (usually yeasts) that degrade the nutrients in silage. As an example, good quality silage that is stable for 50 hours is better than one that spoils after 10 hours of exposure to air.

2. **Why should we be concerned about the aerobic stability of silage?**
   When silages are exposed to air, yeasts can degrade lactic acid, which increases the pH and leads to spoiling. Spoiled silage is especially bad when fed to ruminants because it is low in nutritive value and dry matter intake can be severely depressed. Aerobic spoilage in the silo may also lead to the production of mycotoxins, which can result in reduced animal performance.

3. **When is aerobic stability of silages a problem?**
   Some heat occurs from the natural process of fermentation and this should not be confused with heating from spoilage. However, extensive and prolonged heating during the early period of ensiling may be a result of excess air trapped in the forage mass. Warm weather and exposure to air, encourages the growth of spoilage microbes in silage.

4. **Are some crops more prone to aerobic spoilage than others?**
   Yes. Silages that contain large amounts of starch (e.g. corn silage and barley silage) tend to spoil more readily than other silages but alfalfa and grass silages can also readily spoil. Silages that are very dry also tend to spoil more quickly when exposed to air than those with a high moisture content. High moisture corn also tends to spoil rapidly when exposed to air.

5. **What management factors can improve the aerobic stability of silages?**
   Wilting to the proper moisture content for the specific crop and silo, correct chop length, rapid filling, good packing, and immediate sealing of silos will help to prevent excess air from spoiling silage. Good bunker face management and feedout rate can also help to keep silages from spoiling.

6. **What silage additives can help to improve the aerobic stability of silages?**

Buffered propionic acid-based additives applied at the time of ensiling at 2 to 4 lb. per ton of fresh forage can help to improve the aerobic stability of silages. Preservatives that can be added to a TMR at the time of feeding are also available, but if silage is spoiling to a considerable extent in the silo, adding these products only at feedout may not be the best option. Anhydrous ammonia can be used on corn silage to improve its aerobic stability, but ammonia is extremely hazardous to use.

Traditional microbial inoculants improve fermentation but do not consistently improve the aerobic stability of silages. However, several new products contain microbes that specifically improve the aerobic stability of silages. One of these microbes, *Lactobacillus buchneri* 40788 has markedly improved aerobic stability in silages.

7. **How does *Lactobacillus buchneri* 40788 improve the aerobic stability of silages?**
   Unlike most microbes found in silage inoculants, *Lactobacillus buchneri* 40788 is a heterolactic microbe that produces high concentrations of acetic acid, and sometimes lesser amounts of 1, 2 propanediol, propanol, and propionic acid. Other antifungal compounds may also be produced as well. Both acetic and propionic acid are more effective at reducing the growth of yeasts and molds than is lactic acid. Thus research studies have shown that silages treated with *Lactobacillus buchneri* 40788 remain unspoiled for much longer periods of time than untreated silage when exposed to air.

8. **What kind of improvement in aerobic stability is expected from treatment with *Lactobacillus buchneri* 40788?**
   An absolute number for improvement in aerobic stability from any additive is difficult to give because so many factors can affect the movement of air into the silage mass. In addition, silage can begin to spoil days before it is actually placed in the feed bunk. However, in research studies, silages treated with *Lactobacillus buchneri* 40788 have taken between fifty to several hundred hours longer to spoil than untreated silage.

9. **Does *Lactobacillus buchneri* 40788 work on all types of silages?**
   Yes. Research has shown that *Lactobacillus buchneri* 40788 can improve the aerobic stability of corn, barley, ryegrass, alfalfa silage, and wheat silage. *Lactobacillus buchneri* 40788 has also improved the aerobic stability of high moisture corn.

10. **Should I be concerned about dry matter losses in the silo because *Lactobacillus buchneri* 40788 is a heterolactic acid bacteria?**
    Probably not. Research conducted with *Lactobacillus buchneri* 40788 has shown that sometimes the loss of dry matter in the silo is slightly more than in untreated silage. However, these losses were small. The potential for sparing greater spoilage losses during storage and feedout out weighs the small losses that might be incurred as a result of the fermentation.

11. Should I be concerned that the high concentrations of acetic acid in silages treated with *Lactobacillus buchneri* 40788 might reduce intake?

Probably not. In some past studies (not involving *Lactobacillus buchneri* 40788), silages with high concentrations of acetic acid have been associated with depressions in intake. However, there is no direct evidence that acetic acid itself is responsible for this finding. In addition, acetic acid produced by *Lactobacillus buchneri* 40788 occurs via a pathway that is different from that used by other heterolactic acid bacteria. To date, research studies have shown that feeding silages treated with *Lactobacillus buchneri* 40788 does not reduce the dry matter intake of dairy cows (three lactation studies) or sheep (one study).

12. What is the proper application rate for *Lactobacillus buchneri* 40788?

Our research has shown that in typical crops and conditions in the U.S., *Lactobacillus buchneri* 40788 must be applied at a rate to achieve about 400,000 colony forming units per gram of wet forage. This is higher than the recommended application rate of 100,000 colony forming units per gram of wet forage for traditional microbial inoculants.

13. Are all *Lactobacillus buchneri* the same?

No. The data reviewed in this article has been generated specifically with the strain *Lactobacillus buchneri* 40788 and should not be considered generic to all *Lactobacillus buchneri* strains.

14. When should one consider using *Lactobacillus buchneri* 40788?

Lactobacillus buchneri 40788 should be used in cases where aerobic stability is a problem. For example, bunk, pile or pit silos with large exposed surfaces are good candidates for treatment with *Lactobacillus buchneri* 40788. If spoiling silage occurs only during warm weather, treating only the portion of silage that would be fed during that time of the year may be an option (this may be more difficult to do in a bunk rather than tower or bag silo. Silage moved from one silo structure to another and or silage exposed to air for several days before feeding should be considered for treatment with *Lactobacillus buchneri* 40788.

15. How would I know if the inoculant I am buying has Lactobacillus buchneri 40788 in it?

Any product that contains *Lactobacillus buchneri* strain 40788 will identify the strain as 40788 on the list of ingredients on the product labelling. If you are looking at product literature then, the 40788 designation to be featured both in the text and in the product description section.

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