

GET THE FACTS ABOUT SILAGE INOCULANT

By the Mycogen Seeds Dairy Nutrition Team



HIGHLIGHTS

A silage inoculant — 11CFT — has been touted to improve fiber digestibility in treated corn silage.

The question has been raised of whether feeding conventional corn silage treated with 11CFT can produce results similar to feeding BMR corn silage.

While 11CFT may improve fiber digestibility to an extent, independent research indicates the improvement in fiber digestibility in treated silage is not comparable to feeding BMR corn silage.

If producers want to feed silage with high fiber digestibility, they should choose BMR.

When fresh-cut silage is stored in an airtight structure, naturally occurring bacteria begin to ferment the sugars in the forage and produce lactic acid as part of the fermentation process. Eventually, sufficient acid is produced by these bacteria to drop the pH in the silage storage system low enough to preserve or stabilize the silage for a long time. The fermentation process to stabilize silage takes a minimum of three weeks but often takes five weeks or longer. It is advantageous for the silage to stabilize as quickly as possible because valuable nutrients are used in the fermentation process.

HOW INOCULANTS WORK

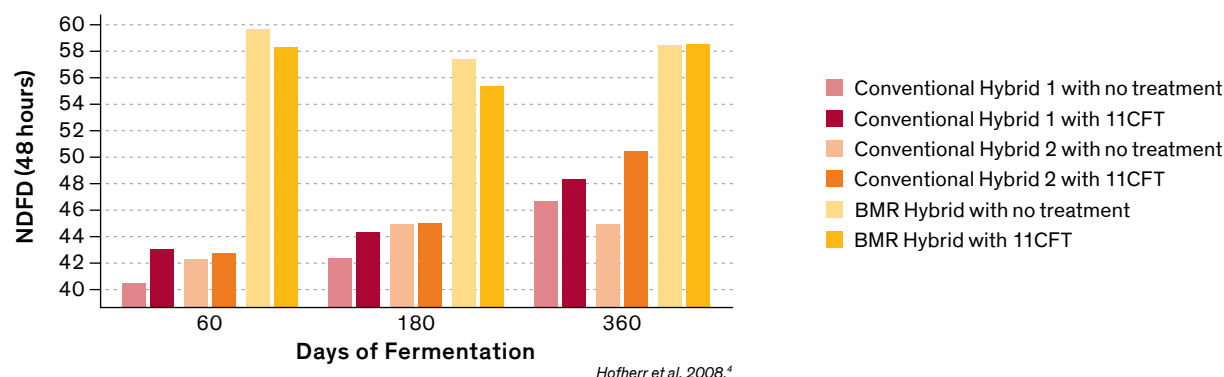
Silage inoculants work by adding *Lactobacillus*-producing bacteria to fresh silage to accelerate the acid production needed to preserve the silage. Silage treated with an inoculant stabilizes faster and, therefore, maintains higher amounts of nutrients than untreated silage. Research indicates that a *Lactobacillus*-type organism (*Lactobacillus buchneri*) that also produces acetic acid may be advantageous to use in an inoculant as the acetic acid produced improves the bunk life of the silage after feeding.

Adding enzymes to improve silage fermentation has been studied, with mixed results. However, several studies have shown that adding an esterase enzyme can improve fiber digestion (Adesogan 2008)¹. In research reported in 2006, strains of *L. buchneri* were isolated that not only produced lactic and acetic acids but also produced the enzyme ferulate esterase (Nsereko et al. 2006)². Silage treated with this organism was reported to improve Neutral Detergent Fiber digestibility (NDFD) by 5 to 7 units (Nsereko et al. 2006)³.

INDEPENDENT RESEARCH RESULTS

After the results of the digestibility improvement were announced, 11CFT was introduced commercially — with the unique *L. buchneri* strain that produces the ferulate esterase. Many questions were asked about whether silage treated with this inoculant could improve the digestibility of conventional silage to be comparable to brown midrib (BMR) corn silage. Studies conducted by independent researchers have been reported about this product. Hofherr et al. (2008)⁴ at the University of Delaware studied the effect of 11CFT compared with nontreated silage with two conventional silage hybrids and a BMR hybrid. The samples were analyzed at 60, 180 and 360 days of ensiling (Table 1).

TABLE 1. EFFECT OF 11CFT ON NDFD (48 HOURS) FROM THREE CORN SILAGE HYBRIDS ANALYZED AT DAYS 60, 180 AND 360 OF FERMENTATION



Adesogan (2008)¹ reported on an experiment conducted at the University of Florida in which two conventional hybrids were treated with no inoculant (control) or 11CFT. Table 2 presents the NDFD and aerobic stability data of the experiment. One of the benefits of inoculants with *L. buchneri* is the aerobic stability of the silage after feed out. Results from Adesogan (2008)¹ are mixed in this area when using the 11CFT strain of *L. buchneri*, with one hybrid showing poorer aerobic stability when treated. Results with NDFD were mixed as well, with one hybrid showing very little effect from the inoculant and another hybrid showing an improvement of 5.4 units at 24 hours and 5.7 units at 48 hours when treated with 11CFT.

TABLE 2. EFFECT OF 11CFT ON AEROBIC STABILITY AND NDFD OF TWO CORN SILAGE HYBRIDS

	HYBRID 1		HYBRID 2	
	Control	11CFT	Control	11CFT
Aerobic stability, H	58.7	116.0	102.0	81.5
NDFD, % of DM – 24 hours	28.3	28.7	22.2	27.6
NDFD, % of DM – 48 hours	56.5	58.1	52.1	58.0

The 11CFT is a step forward in inoculant technology. It is the only inoculant that improves the quality of silage, while other inoculants act to reduce the amount of loss through fermentation. Research suggests that NDFD can be improved by the usage of 11CFT, but results are mixed and more independent research is needed. Improvements in NDFD by using 11CFT do not approach the impact of feeding BMR. Improvements in NDFD by using 11CFT have ranged from no improvement to 5.7 units of improvement, with the average in reported studies being 2.56 units of improvement in conventional hybrids. Research has shown no NDFD improvement when BMR is treated with 11CFT.

BMR averages 10 to 12 units of improvement in NDFD compared with conventional hybrids, without the use of an inoculant. If producers want to feed corn silage with high fiber digestibility, they should choose Mycogen brand BMR.

For more information on how Mycogen® brand BMR corn silage can improve a dairy's bottom line, visit the Mycogen Seeds website at www.mycogen.com or contact your local Mycogen Seeds representative.

¹Adesogan, A. T. 2008. Recent advances in bacterial silage inoculant technology. Florida Ruminant Nutrition Conference *Proceedings*.

²Nsereko, V. L., B. K. Smiley, W. M. Rutherford, A. J. Spielbauer, E. K. Harman, K. J. Forrester, and G. H. Hettinger. 2006. Influence of inoculating forage with ferulate esterase producing lactic acid bacteria on ensilage of ruminal degradation of fiber. *J. Dairy Sci.* 90 (Supp. 1): 375.

³Nsereko, V. L., B. K. Smiley, W. M. Rutherford, A. J. Spielbauer, E. K. Harman, K. J. Forrester, and G. H. Hettinger. 2006. Influence of a silage inoculant containing ferulate esterase producing *Lactobacillus buchneri* strain PTA6138 on aerobic stability and ruminal degradation of corn silage. *J. Dairy Sci.* 90 (Supp. 1): 375.

⁴Hofherr, M. W., L. J. Reich, M. C. Der Bedrosian, M. C. Santos, W. Hu, and L. Kung Jr. 2008. Effect of a microbial inoculant producing ferulic acid esterase on the fermentation and NDF digestibility of normal and BMR corn silages. *J. Dairy Sci.* 92 (Supp. 1): 32.

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