

Introducing Crystal Creek®'s Inoc-U-Lock™ Buchneri:

*An Inoculant Specifically Designed For Corn Silage
And High Moisture Grains*



By Dan Leiterman

The very foundation of profitable livestock production relies on feeding high quality feedstuffs. Also, the need to feed high quality forages which are critical to a healthy bottom line for any dairy or beef producer, is a well understood principle in

the industry. Over the years research has shown that applying a good inoculant to feedstuffs at the time of ensiling can provide a significant return on investment for the producer. A well designed inoculant program will help speed fermentation to reduce dry matter loss, reduce protein degradation, reduce lost energy (sugars), stabilize the face quality and improve bunk shelf life. Additional benefits include enhanced dry matter intake, improved feedstuff digestibility, improved milk and meat production and ultimately improved profits for the producer. Using a good inoculant like Inoc-U-Lock™ is a smart business decision. The focus of this article is to explain the Inoc-U-Lock™ controlled fermentation process and to describe where the *L. buchneri* bacteria may fit into your program.

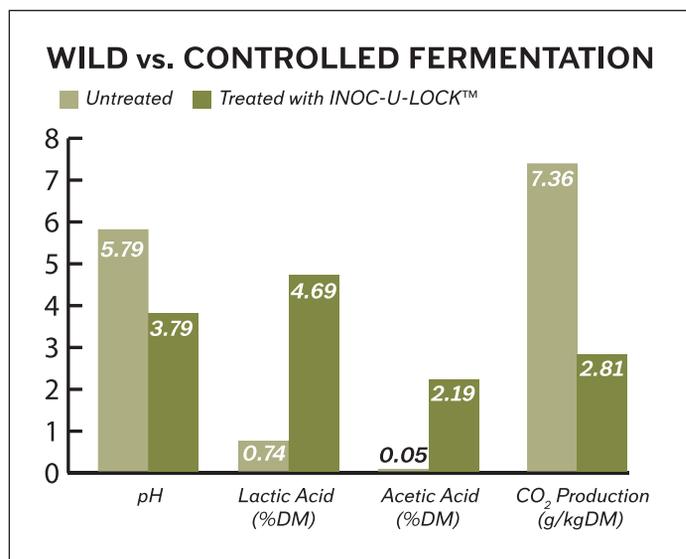
1) Wild vs. Controlled Fermentation:

Wild fermentation relies solely on the bacteria normally found on the feedstuff, which in many cases is inadequate for optimum fermentation (See *Figure 1*). Inoc-U-Lock™ contributes 5 different strains of bacteria to the fermentation process. Each strain of bacteria produces acids (lactic, propionic or acetic) to lower the pH to a range where the next strain of bacteria can take over. The next bacteria strain then produces more acids to continue lowering the pH, until another specific bacteria strain takes over in its optimum pH range. Much like a relay race, each bacteria strain is doing its job and then handing off to the next bacteria team in a controlled step-by-step process, which quickly drives the feedstuff pH to < 4.0. Inoculants containing only one or two bacteria strains, or having bacteria that are weak performers, may not provide the level of control needed to drive optimum



fermentation. Relying on wild fermentation to fill in the pH gaps is just too risky. Inoc-U-Lock™ with its strategic team of bacteria, provides a more driven and controlled fermentation process. Inoc-U-Lock™ also provides 4 categories of enzymes to help make critical nutrients available to the bacteria, allowing the bacteria to produce the acids necessary to lower the pH. A well built enzyme program will add strength and control to the fermentation process, further reducing the risk of lost revenue.

Figure 1 Research trial showing the difference between wild and controlled fermentation



All Inoc-U-Lock™ Products Contain:

(5) Strains Of Bacteria	pH Range	Purpose	(4) Enzymes
Lactobacillus acidophilus	8.5 to 3.5	Fermentation w/Lactic Acid	Cellulase
Pediococcus pentosaceus	7.5 to 4.2	Fermentation w/Lactic Acid	Hemicellulase
Pediococcus acidilactici	7.5 to 4.2	Fermentation w/Lactic Acid	Xylanase
Lactobacillus plantarum	7.8 to 2.0	Fermentation w/Lactic Acid	Amylase
Propionibacterium freudenreichii	6.5 to 4.0	Aerobic Stability w/Propionic & Acetic Acid	

Inoc-U-Lock™ Buchneri Contains:

Inoc-U-Lock™ Buchneri Contains:	Purpose	Enzymes
All the above bacteria plus Lactobacillus buchneri	Aerobic Stability w/Acetic Acid	All of the Above

2) Inoc-U-Lock™ Provides Significant Aerobic Stability

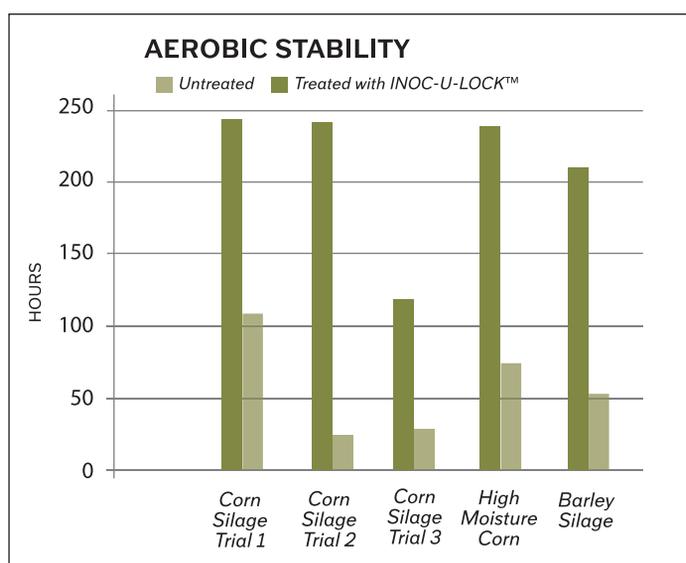
Having aerobic stability on a feedstuff means that when exposed to air, microbes like yeast have difficulty growing, which results in less heating and spoilage of the feedstuff. Research shows that the Inoc-U-Lock™ formula is effective at improving aerobic stability in different types of feeds and their associated storage methods (See Figure 2). Inoc-U-Lock™ reduces the risk of molding and heating on the storage face (piles, bunkers, silos) and in the feed bunk, which means less wasted feed, improved dry matter intakes, better production and improved profitability.

3) The Role Of Lactobacillus buchneri Bacteria In Livestock Feed Inoculants:

Lactobacillus buchneri (L. buchneri) bacteria has become popular in recent years because of its ability to provide additional aerobic stability, thereby supporting even better storage face quality and longer bunk-life to feedstuffs.

It is important to know however, that L. buchneri does not contribute to the fermentation of the feedstuff. It generally takes several weeks before L. buchneri starts to function in the feedstuff, well after the pH has been lowered to 4.0. When L. buchneri does start to function, it eats lactic acid (which has been produced by the fermenting bacteria to drive the pH to < 4.0) and produces both acetic acid and carbon dioxide. Having L. buchneri in an inoculant will help to control yeast growth once the feedstuff is already fermented. By reducing yeast growth, L. buchneri can provide

Figure 2 Research showing aerobic stability.



additional aerobic stability, further reducing storage face spoilage and heating in the feed bunk.

Because L. buchneri contributes nothing to the necessary fermentation process, it should not be the only bacteria in an inoculant. Using only L. buchneri is essentially the same as having a wild, uncontrolled fermentation which is very risky. A fully formulated inoculant like Inoc-U-Lock™ should be applied to the feedstuff to drive a controlled fermentation. Inoc-U-Lock™ Buchneri is a fully formulated fermentation inoculant that contains both P. freudenreichii bacteria and L. buchneri bacteria to help stabilize the face of ensiled/fermented feeds as well as feed in the bunk. These two bacteria work together to protect feed that has been exposed to the air and reduces the risk of heating and spoilage.

(CONTINUED ON PAGE 4)

4) Where To Use A L. buchneri Bacteria:

The preferred feedstuffs for application of an Inoc-U-Lock™ Buchneri is grain silages like corn silage or high moisture grains like high moisture corn. It is not recommended to put L. buchneri on haylage or balage type feedstuffs due to their lower carbohydrate levels and lower risk of yeast growth. Research indicates that the proper application rate of a L. buchneri bacteria would be 100,000 CFU/gram of corn silage and 200,000 CFU/gram of high moisture corn. Adding higher levels (over 100,000 and 200,00 CFU/gram respectively) of L. buchneri to feedstuffs is not necessary for good performance (in most cases) and only adds unnecessary cost per ton to the producer.

5) Application Rates For Inoc-U-Lock™ Buchneri:

Corn Silage:

The recommended application rates for Inoc-U-Lock™ Buchneri on corn silage provides 100,000 CFU/gram of the fully formulated Inoc-U-Lock™ inoculant, plus an additional 100,000 CFU/gram of the L. Buchneri.

High Moisture Corn:

The application rate of Inoc-U-Lock™ Buchneri for high moisture corn is doubled, which provides 200,000 CFU/gram of the fully formulated Inoc-U-Lock™ inoculant, plus an additional 200,000 CFU/gram of the L. Buchneri bacteria. In extreme need situations, Inoc-U-Lock™ Buchneri could be applied at an even higher level to provide 300,000 CFU/gram of the fully formulated Inoc-U-Lock™ fermentation inoculant, plus the 300,000 CFU/gram of the L. Buchneri bacteria.

Storage:

Inoc-U-Lock™ Buchneri is only available in a water soluble form, for liquid application. Inoc-U-Lock™ Buchneri needs to be kept in the freezer (freezer - not the refrigerator) for proper storage prior to use. Appropriate shipping techniques and timing of order shipment (to avoid weekend transit) will help to ensure that you receive a viable product. When ordering any of the Inoc-U-Lock™ inoculants, be sure to do so well in advance, so you have your Inoc-U-Lock™ when you need it.



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6) Inoc-U-Lock™ Buchneri Meets NOP Standards:

Inoc-U-Lock™ Buchneri is formulated to be allowed for organic use. Check with your organic certifier to verify its ability to be used for organic production before applying.

Crystal Creek® Offers A Full Line Of High Performance Inoculants For All Of Your Ensiling Needs, (See Figure 3, 4, 5 and 6).

The Inoc-U-Lock™ line of inoculants are excellent, high performance products, and offer great value. You will find that using Inoc-U-Lock™ in your operation is a smart business decision!

*Freeze Inoc-U-Lock™ Buchneri Until Use

DISCLAIMER: Because the manufacturer cannot control the condition of application, storage and handling practices, no expressed warranty is made. Normal expected results from using this inoculant can only be expected when the application, storage and hauling is followed as instructed.

Figure 3

INOC-U-LOCK™ DRY			
Crop	Corn & Sorghum Silage	Grass or Legume Haylage & Small Grain Silage	High Moisture Corn
25 lb. Bag	Treats 100 tons	Treats 50 tons	Treats 33.3 tons
Bacteria CFUs Per Gram Of Crop	100,000 CFUs/gram	200,000 CFUs/gram	300,000 CFUs/gram
Treatment Cost/Ton	\$0.65	\$1.30	\$1.95

Figure 4

INOC-U-LOCK™ BH (For Baled Hay)			
<i>Tons Per Jar</i>	<i>20 tons</i>	<i>13 tons</i>	<i>10 tons</i>
Grams Per Ton of Baled Hay	20 gm	30 gm	40 gm
% Moisture of Baled Hay	<18%	18-20%	20-22%
Bacteria CFUs Per Gram Of Baled Hay	210,000 CFUs/gram	315,000 CFUs/gram	420,000 CFUs/gram
Treatment Cost/Ton	\$4.10	\$6.30	\$8.20

Figure 5

INOC-U-LOCK™ WS (Water Soluble)			
Crop	Corn & Sorghum Silage	Grass or Legume Haylage & Small Grain Silage	High Moisture Corn
350 gram Jar	Treats 200 tons	Treats 100 tons	Treats 66 tons
Bacteria CFUs Per Gram Of Crop	100,000 CFUs/gram	200,000 CFUs/gram	300,000 CFUs/gram
Treatment Cost/Ton	\$0.65	\$1.30	\$1.95

Figure 6

INOC-U-LOCK™ BUCHNERI		
Crop	Corn & Sorghum Silage	High Moisture Corn
350 gram Foil Packet	Treats 200 tons	Treats 100 tons
INOC-U-LOCK™ Bacteria CFUs Per Gram Of Crop	100,000 CFUs/gram	200,000 CFUs/gram
PLUS L. Buchneri Bacteria	PLUS 100,000 CFUs/gram	PLUS 200,000 CFUs/gram
Treatment Cost/Ton	\$1.40/ton	\$2.80/ton

“Ask the Vet and Ask the Nutritionist”

Please submit your animal health or nutrition questions in writing to:

Crystal Creek® - “Ask the Vet/Nutritionist”
 1600 Roundhouse Road, Spooner, WI 54801



OR

askthetvet@crystalcreeknatural.com