



Forage Facts



Fact versus Fiction in Forage Fermentation

www.cropcure.com

Crop Cure® - a division of Domain, Inc.

"An ounce of prevention is worth a pound of cure"

What losses occur during fermentation and how can they be prevented?

The silage fermentation process which consists of five distinct phases is crucial in the preservation of nutrients in your ensiled forage. "Forage will never get better than the day you cut it". Minimizing storage losses is where Crop Cure® comes in.

Phase 1

This is the aerobic phase. It starts at initial ensiling and continues until all oxygen is depleted from the forage mass. This phase typically lasts 2-4 days after initial ensiling. Factors affecting this period are: 1) length of cut, 2) moisture and 3) packing and proper compaction. This phase is where problems with excess

heating, dry matter loss, and bad microorganisms can occur. The combination of ingredients in Crop Cure® and Crop Cure 2 initiates the pH drop, producing acetic acid. This inhibits undesirable aerobic microorganism growth and molds. Bacteria inoculants have very little benefit during this phase due to the presence of oxygen. This is the reason research has demonstrated Crop Cure® treated forage has 10% more protein available for digestion. Inoculants cannot make this claim because heat damage occurs during oxygen burn up and lactic acid bacteria do not thrive in an environment where oxygen is present.

Phase 2

This phase begins when the oxygen is depleted. It should last only 24 to 72 hours for optimal results. During this phase, carbohydrates are being converted into acetic acid, lactic acid, and alcohols. The acetic and lactic acids play a major role in the pH reduction in the silage. The rapid decline in pH will help reduce DM losses.

Phase 3

During this phase the lactic acid dominates control over the conversion of water soluble carbohydrates to continue the reduction in pH. Phase III is the longest phase and can last two to three weeks. When Phase III is completed the pH should be low enough to inhibit all bacterial growth.

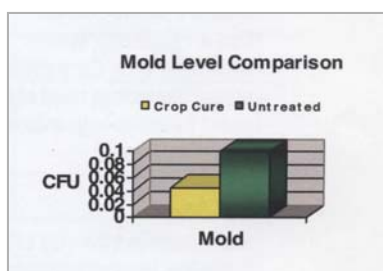
Phase 4

This is the most stable phase, during which the pH drops down to 4.2 or lower. The ideal pH is 3.8-4.2. As long as moisture and oxygen are kept out of the structure, there should be little or no additional nutrient loss.

Phase 5

This phase occurs during feed-out. The silage is reintroduced to oxygen and can undergo another aerobic phase. If the silage is not treated properly this stage can cause extensive nutrient loss due to recurring mold and yeast that has been dormant during the ensiling process. (U of M) research shows Crop Cure treated forage has better bunk stability.

Minimize storage losses and improve bunk stability of your forages by treating them before ensiling with Crop Cure® to assist in proper fermentation steps.



Five Phases Silage Fermentation & Storage

PHASE I	PHASE II	PHASE III	PHASE IV	PHASE V
Cell Respiration Production of CO ₂ , Heat and Water	Production of Acetic Acid and Lactic Acid Ethanol	Lactic Acid Formation	Material Storage	Aerobic Decomposition on Re-Exposure to Oxygen
69° F*	90° F	84° F		84° F
Temperature Change				
6.0-6.5	5.0	4.0		7.0
pH Change				
Mold & Yeast Activity	Acetic Acid and Lactic Acid Bacteria	Lactic Acid Bacteria		Mold & Yeast Activity

Adapted from McCullough
*Temperature dependent on ambient
perfect conditions

Crop Cure® Investment Benefits

- 3.08 pound increase in milk production (4% FCM) per cow/ per day (U of M)
- 89.5 pounds more milk per ton of haylage based on 4% fat corrected milk (Ohio State)
- Retains up to 10% more protein available for digestion.
- Reduces dry matter loss up to 50% (Ohio State)
- Research shows treated haylage has better bunk stability (U of M)
- Crop Cure®/Crop Cure 2 haylage produces an increase in beneficial acids—an important factor in higher butterfat test (U of M)

Questions to ask yourself before buying a preservative.

- Does the product you are considering have a mold prevention claim?
- Is the product thoroughly tested and the research proven?
- What are the economics of the product you are considering?
- Is the product guaranteed?

Don't let mold and mycotoxins steal you blind. Use Crop Cure as the "ounce of prevention" for your forage and minimize storage losses. Prevention makes good sense!

Crop Cure® Economics

Return on Investment	Avg. D. M. Loss	10% Less Heat Damage														
_____ Tons of Silage Stored	<table border="1" style="width: 100%;"> <thead> <tr> <th colspan="2" style="background-color: #2e7d32; color: white;">Average Dry Matter Loss</th> </tr> <tr> <th style="background-color: #2e7d32; color: white;">Silo Type</th> <th style="background-color: #2e7d32; color: white;">DM Loss (%)</th> </tr> </thead> <tbody> <tr> <td>Oxygen-limiting</td> <td style="text-align: center;">5-10%</td> </tr> <tr> <td>Concrete</td> <td style="text-align: center;">5-15%</td> </tr> <tr> <td>Bunker/Trench</td> <td style="text-align: center;">15-30%</td> </tr> <tr> <td>Stack/pile</td> <td style="text-align: center;">20-40%</td> </tr> <tr> <td>Bag</td> <td style="text-align: center;">10-20%</td> </tr> </tbody> </table> <p>Source: USDA</p>	Average Dry Matter Loss		Silo Type	DM Loss (%)	Oxygen-limiting	5-10%	Concrete	5-15%	Bunker/Trench	15-30%	Stack/pile	20-40%	Bag	10-20%	_____ Dry Matter Tons
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= _____ Tons Dry Matter Lost During Fermentation		_____ Tons protein saved by treating with Crop Cure®														
x 50% _____ Retained dry matter from Crop Cure®/Crop Cure 2		÷ .44 _____ Soybean meal														
= _____ Tons of Dry Matter Saved		_____ Tons of Soybean Meal Saved														
x _____ Value Per Ton (DM basis)		x \$300.00 Ton														
= _____ Value of Additional DM stored		_____ Total														
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Fill out the following quiz and return it to Domain, Inc.—156 High St.—New Richmond, WI 54017 to enter a drawing for a Crop Cure® sweatshirt or \$500.00 of free product (all answers are contained in the newsletter).

- | | |
|---|--|
| 1. Bacteria inoculants are effective against mold growth? | <input type="checkbox"/> Fact <input type="checkbox"/> Fiction |
| 2. Crop Cure® initiates pH drop in forage? | <input type="checkbox"/> Fact <input type="checkbox"/> Fiction |
| 3. Crop Cure® is research proven to improve bunk stability at feed out? | <input type="checkbox"/> Fact <input type="checkbox"/> Fiction |
| 4. Crop Cure® treated forage is more corrosive than untreated forage? | <input type="checkbox"/> Fact <input type="checkbox"/> Fiction |
| 5. Crop Cure® is guaranteed? | <input type="checkbox"/> Fact <input type="checkbox"/> Fiction |

Wild Card!

6. How does Crop Cure® work and why?

Name: _____ Address: _____

City: _____ State: _____ Zip: _____ Phone: _____

Forage Questions? For a forage review on your operation, e-mail www.cropcure.com or call (800) 472-6925