*Handy guide to silage **fermentation***

ECOSYL™

For consistently better silage

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What does the underlined text mean?

Throughout this document there are links to pages and other sections for additional information. You can quickly link from any piece of text that is underlined in red.

Introduction – huge benefits from effective fermentation

As well as being a highly cost-effective way to feed cows, great silage gives a top return from one of your biggest assets – your home-grown grass. Plus, it helps reduce reliance on bought-in feed and there can be 'hidden' benefits, like improved cow health.

Key to producing it is a good fermentation, which essentially preserves grass by 'pickling' it in beneficial acid. But while other steps in silage-making are relatively controllable – such as when to cut, how long to wilt, and chop length – if you simply leave the clamp to 'ferment itself' you have no control over the bacteria present – good ones or bad ones. Which effectively leaves nutrient preservation of this valuable feedstuff open to chance.

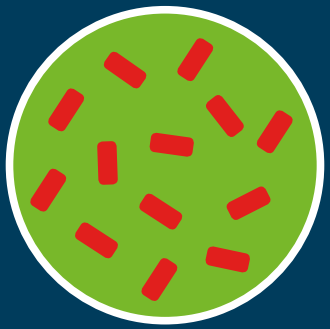
Taking a few moments to understand fermentation, and how to take back control of it using 'friendly bacteria', can pay dividends. It's what this handy guide is all about.

Silage aims: Maximise Feed Value & Minimise Dry Matter (DM) Losses. **To do this you need a good fermentation.**

What happens when silage ferments?

Natural plant sugars

+



Lactic acid bacteria

Lactic acid
+ Acetic acid
+ Ethanol
(is not an acid so does not help)
+ CO_2 = DM loss

Why is lactic acid important?

Lactic acid is the strongest silage acid and its production does not result in DM losses. An efficient fermentation makes best use of the sugars by maximising lactic acid.

Good Fermentation
(High ratio of Lactic acid)

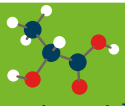
Faster pH fall
Less protein breakdown
Lower DM losses
More palatable silage

Poor Fermentation
(Low ratio of Lactic acid)

Slower pH fall
More protein breakdown
Higher DM losses
Less palatable silage

Homo-fermentation

Silage fermentation results in DM and Energy losses. How big these are depends on the end products of fermentation. The best silage fermentation is when sugars are fermented only to lactic acid as with inoculant bacteria.

Type of fermentation	Food source	End Product	Dry matter (DM) loss	Energy loss
Homo-fermentative	 Glucose/Fructose	 Lactic acid	 **Zero**	**0.7%**

Hetero-fermentation

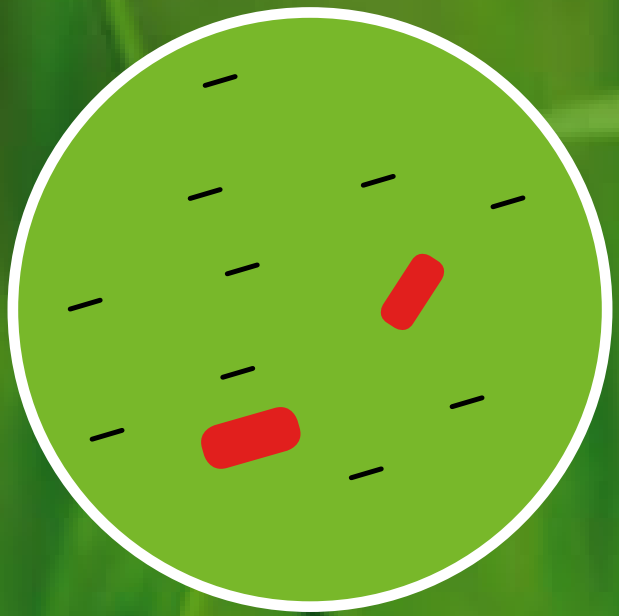
Less efficient lactic acid bacteria and other less desirable bacteria, e.g. enterobacteria and clostridia, ferment sugars to a mixture of end-products. Some can also ferment lactic acid to highly undesirable end products, such as butyric acid.

Type of fermentation	Food source	End Product	Dry matter (DM) loss	Energy loss
Hetero-fermentative	Fructose	Lactic & Acetic acid		1%
Hetero-fermentative	Glucose	Lactic acid & Ethanol		1.7%
Entero-bacterial	Glucose	Acetic acid & Ethanol		16.6%
Clostridial	Lactic acid	Butyric acid		18.4%

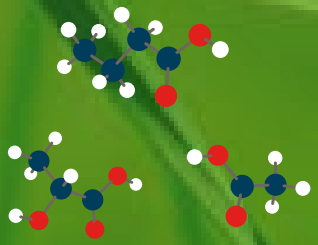
*Natural grass has **bad** bacteria...*

Natural fermentation (heterofermentative)

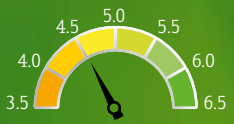
Natural plant sugars



Bacteria already on the plant, including low numbers of less than ideal types of Lactic Acid Bacteria.



Acetic acid (weak acid), Ethanol (not an acid), CO_2 (lost as gas), Butyric acid, Lactic acid



Higher pH

... and **good** bacteria

Inoculated fermentation (homofermentative)

Adding an inoculant makes the fermentation faster and more efficient, maximising production of the best acid – lactic acid

Natural plant sugars

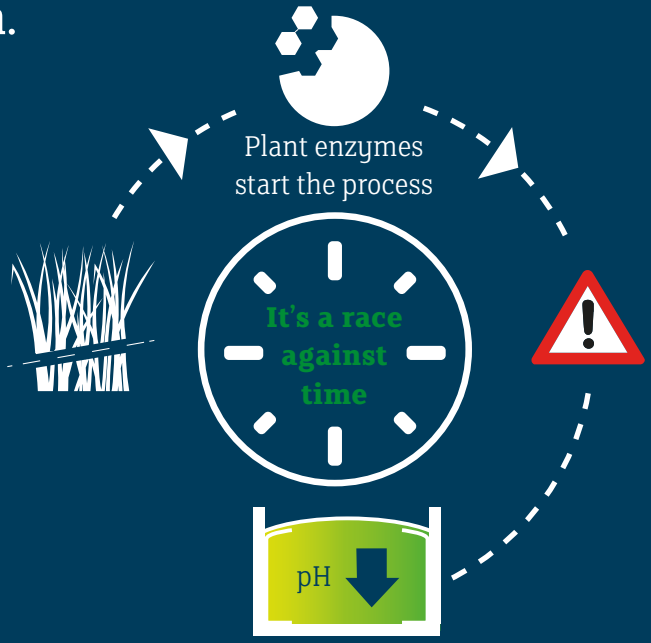
Inoculant supplies high numbers of specially selected Lactic Acid Bacteria which dominate the fermentation *(e.g. Lactobacillus plantarum)*

Lactic acid (strongest acid)

Lower pH

What happens to plant protein?

For good rumen function a high % of the silage nitrogen should be present as true protein but as soon as the plant is cut protein starts to be broken down.



What causes DM and energy losses during ensiling?

When DM is lost so is energy. That means there is less to feed and it has a lower nutritive value. There are two reasons for increased losses:

1. Prolonged Initial Respiration

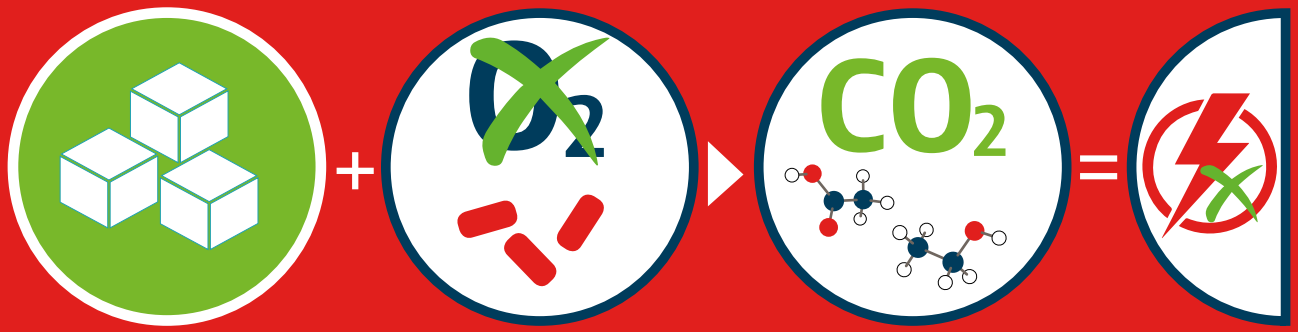
Natural plant sugars

Oxygen
Plant enzymes
Micro-organisms

100% DM &
Energy losses

What causes DM and energy losses during ensiling?

2. Poor Fermentation



Natural plant sugars

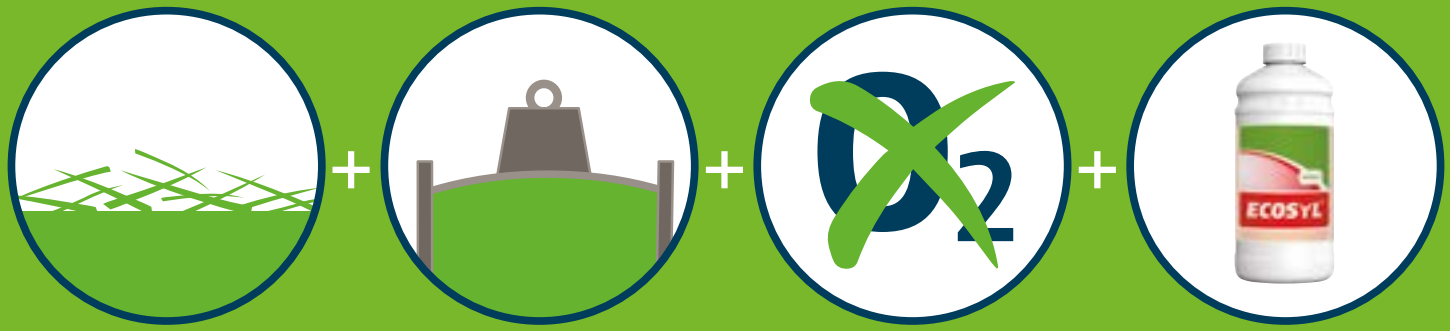
Micro-organisms

A mixture of
End products
& CO_2

partial DM &
Energy loss

How do we minimise losses?

Minimise losses by:



Rapid wilting

Good clamp management

Removal of oxygen

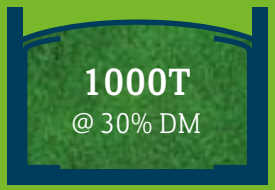
Inoculant to improve fermentation

Reduces respiration and preserves energy

Consequences of DM losses

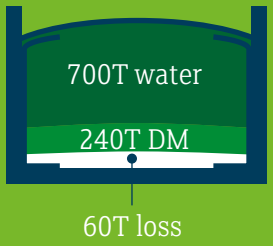
Silage in a clamp

Fresh weight

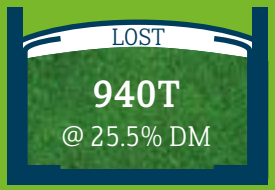


Silage composition

We talk losses in DM terms so a 20% DM loss:



Silage to feed



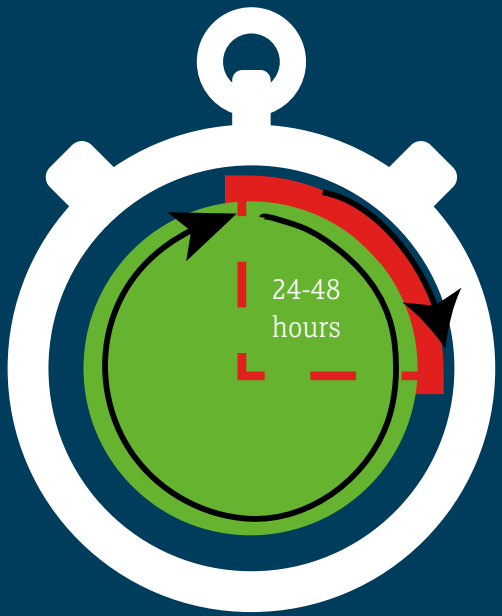
Less silage to feed and it has a lower nutritional value

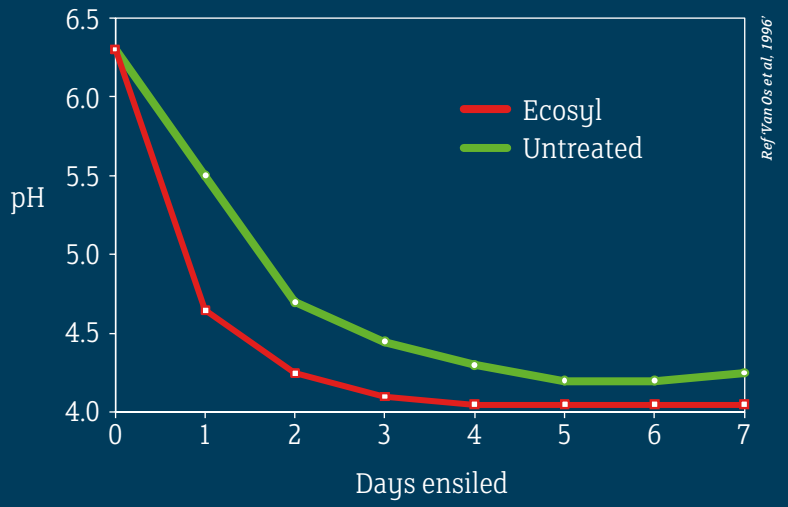
What is Ecosyl?

- An inoculant that applies high numbers of the unique, very efficient MTD/1 strain of *Lactobacillus plantarum*.
- The only silage inoculant where the bacteria are manufactured by continuous culture, making them very robust. This ensures rapid activity after application and enhanced storage and tank life stability.
- Backed by more independent trials than any other inoculant.

How does Ecosyl improve fermentation?

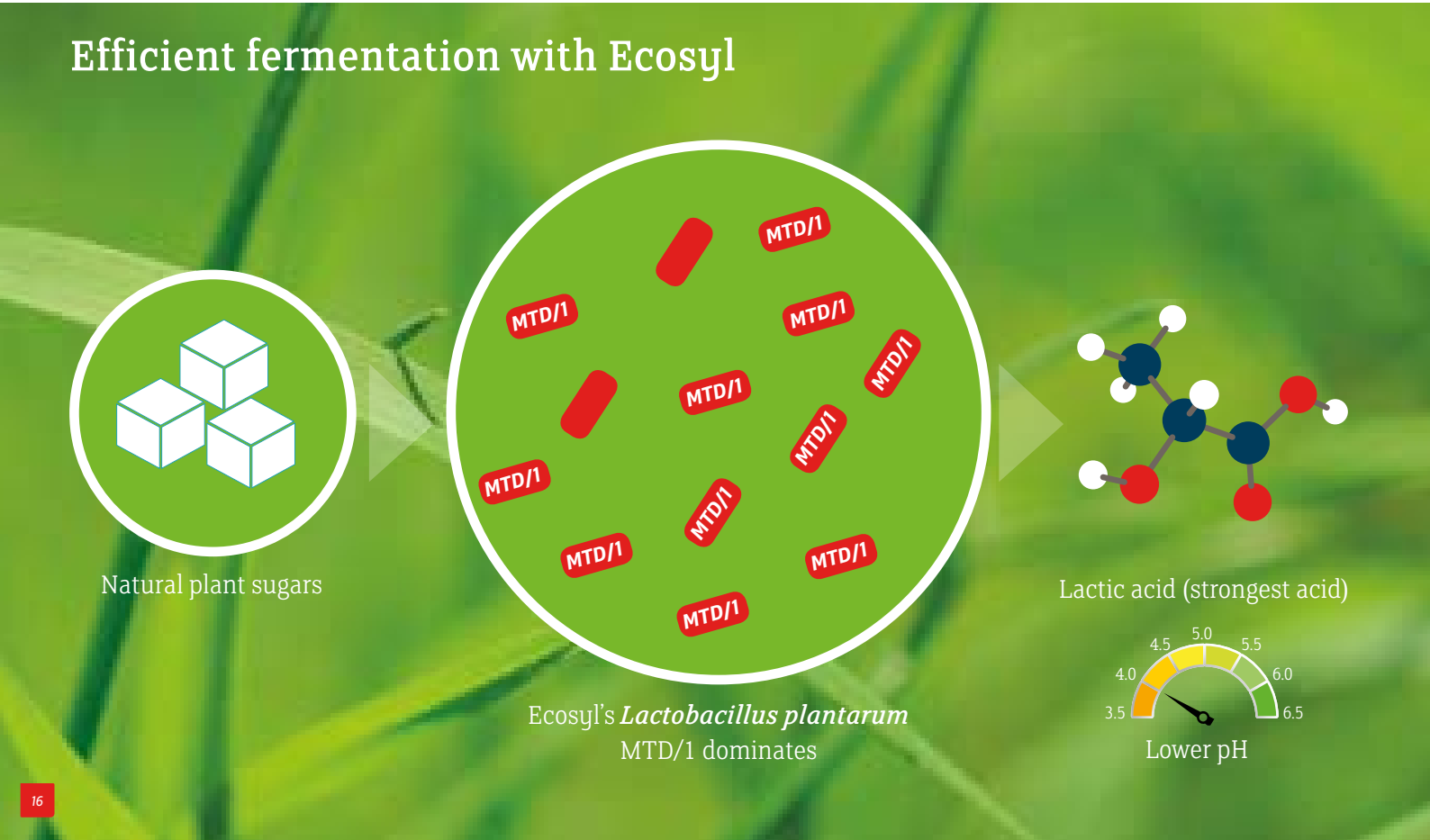
The MTD/1 bacteria in Ecosyl multiply very fast and convert sugars only to strong lactic acid with no DM loss, so the pH falls faster to a lower, more stable pH with reduced DM losses.



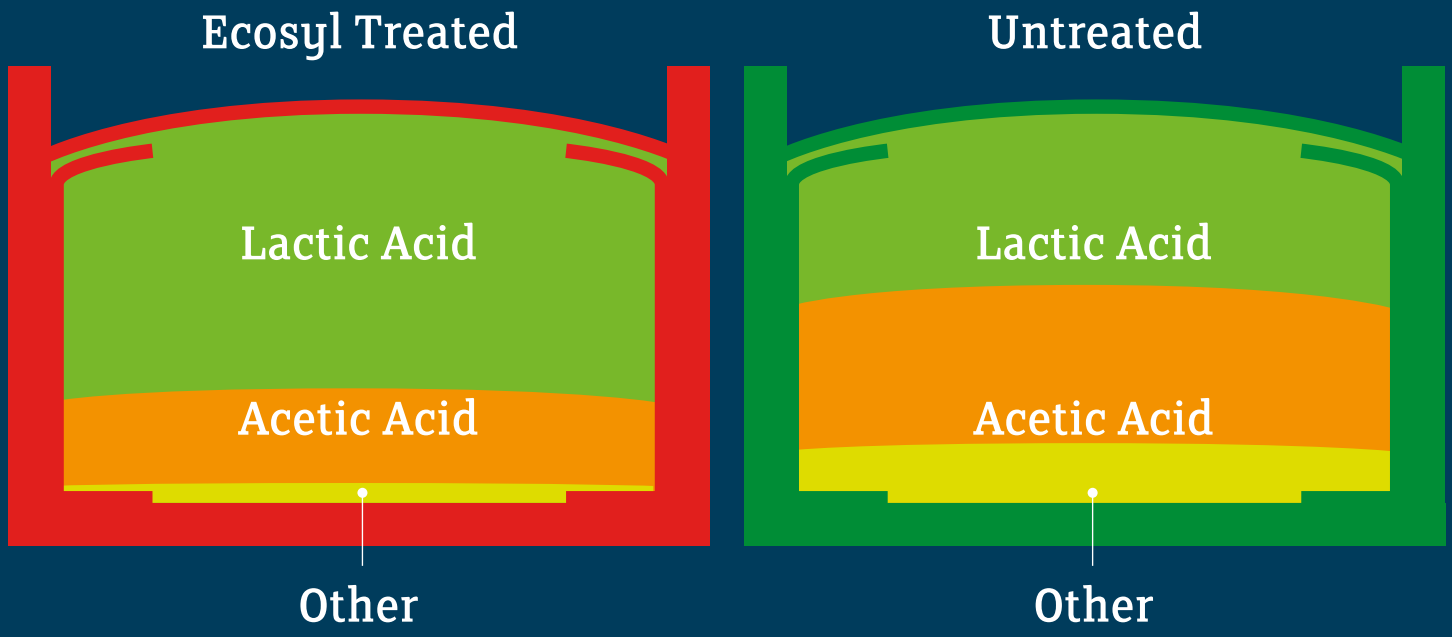


Ecosyl treated

The desired fermentation process



Effective fermentation - a typical comparison



Energy from silage

• 1000T grass (@10T/acre) • 300T DM (@30% DM)

15 grass trials MTD/1 treated vs untreated, average DM recovery 95.5% vs 91.8%. Energy recovery: 18 trials, invivo, MTD/1 treated vs untreated, average ME 11.3 vs 10.6 MJ/kg DM.

	Untreated	Treated
Dry matter	275T	287T
Energy	10.6MJ	11.3MJ
Total energy	2,915,000MJ	3,243,100MJ

A difference of 328,100MJ

Energy

Dairy Cow

Partitioning of Nutrients

Maintenance
Milk Production
Fertility
Body Condition

ECOSYL – proven in over 200 independent trials

- ✓ Faster pH fall
- ✓ More efficient fermentation
- ✓ Less protein breakdown
- ✓ Reduced fermentation losses
- ✓ Higher nutritive value
- ✓ Higher digestibility
- ✓ Improved palatability and intake
- ✓ Improved animal performance


They don't understand the science
but they do know fine forage when they're fed it
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