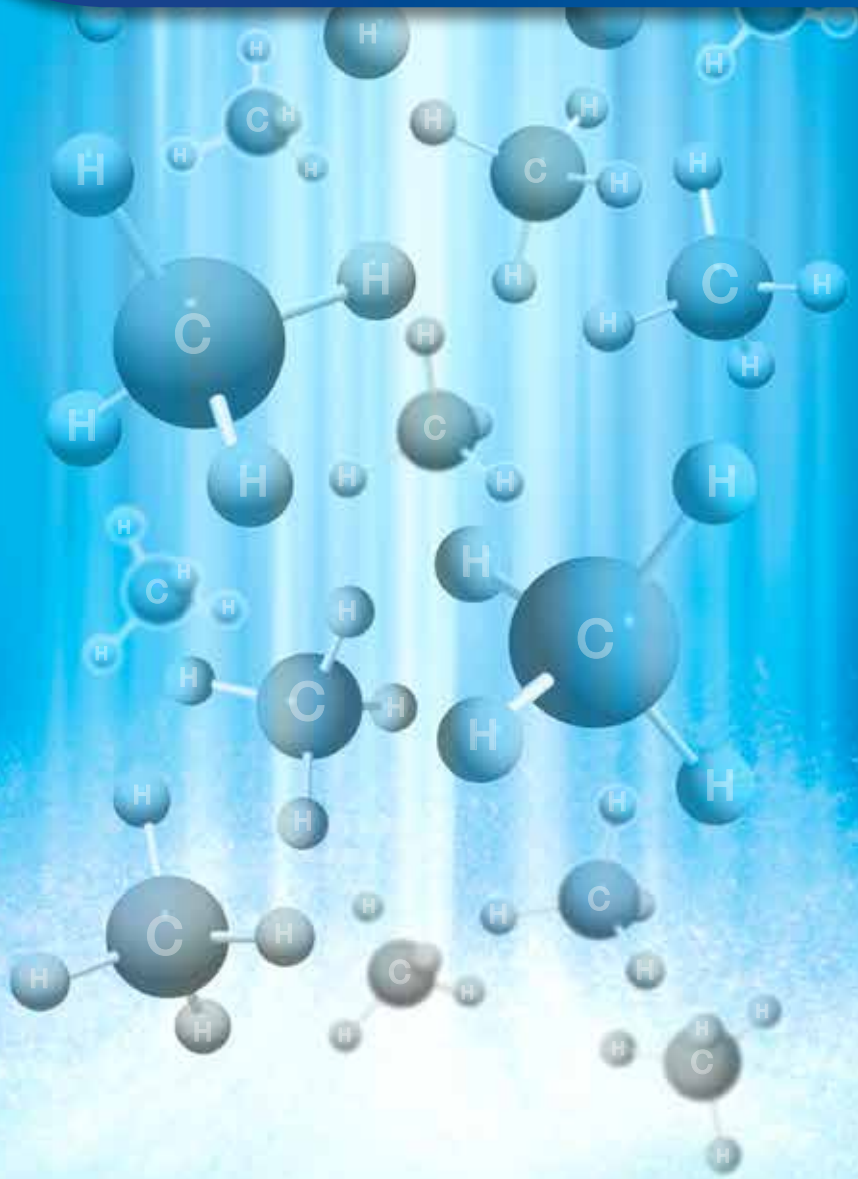


BIOGILLES®



**A cascade
of energy!**



The production of methane is only the latest of a series of good **RESULTS** following each other in cascade.

A continuous series of good results leads to the expected final GOAL: **MAXIMUM ENERGY EFFICIENCY** that is **MAXIMUM ECONOMIC YIELD** of methanogenesis.



The **FIRST GOAL** is the **MAINTENANCE OF AVAILABLE ENERGY** of the ensiled mass for digester feeding.

Mass and energy are neither created nor destroyed, they are preserved, but ... they are transformed!



PROBLEM N. 1: HOW THE ENERGY IS TRANSFORMED

In accordance with Einstein's relation, mass and energy are equivalent: $E = mc^2$

Where "E" is the energy emitted from the body, "m" is the mass that is lost, and "c" is a constant (speed of light).

But there is a problem: the same mass, "m", can be transformed into many forms of matter/energy!

Thus a significant part of ensiled mass is transformed into forms of matter / energy other than methane, such as heat, carbon dioxide, hydrogen, which are dispersed in the environment.

The ensiled biomass preserves most of the available energy only through lactic fermentation, due to the multiplication of good lactic acid bacteria (LAB).

The growth of non-LAB causes bad silage fermentation and poor acidification, with losses of available biomass/bioenergy, that is transformed into heat, carbon dioxide, hydrogen, that is in unavailable forms!



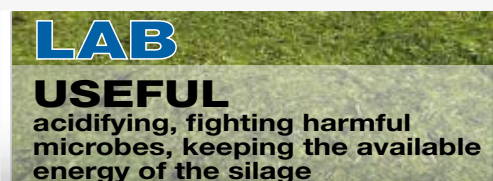
In biogas production, **ENERGY EFFICIENCY** means, first of all, **MAINTAINING of the ensiled biomasses AVAILABLE ENERGY**, which represents the basis of the economic success of the company. In fact, about 75% of operating costs is represented by the costs of the utilized substrates.

BIOFILGAS IS THE STARTER FROM WHICH THE ENERGY EFFICIENCY IN BIOGAS PRODUCTION BEGINS!

BIOFILGAS: mix of *Lactobacillus plantarum* and *Lactobacillus casei* in specific and targeted synergy to reduce mass/energy losses and improve methanogenesis yield.

BIOFILGAS LABs, **FORAGE QUALITY** and **ENSILING TECHNIQUE** are the source of **ENERGY EFFICIENCY** in methanogenesis.

REMEMBER! Silage microorganisms are divided into two categories:



LAB

USEFUL

acidifying, fighting harmful microbes, keeping the available energy of the silage



NON-LAB

HARMFUL

to the silage, to the energy transformation and to your profit



BIOSTILGAS® INCREASES THE AVAILABLE ENERGY!

The **HOMOGENEOUS DISTRIBUTION** of **BIOSTILGAS®** LABs in properly ensiled biomass allows you to obtain a silage:

- homogeneous in the lactic fermentation
- devoid of decaying areas
- rich in available energy for the growth of methane bacteria in the digester.

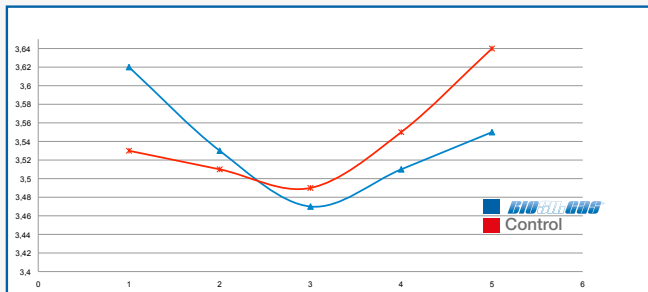
BIOSTILGAS®: MORE THAN THIS CAN'T BE!

500,000 CFU supplementation per gram of silage: who else?
In an exclusive, specific and efficient combination.

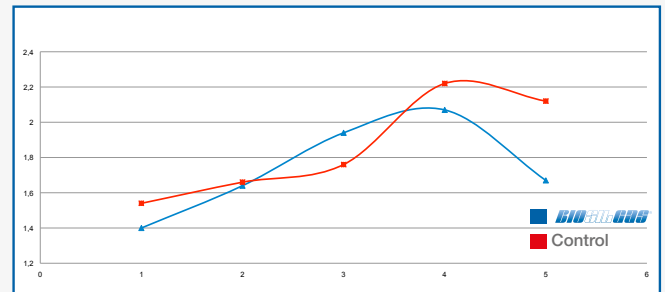
EXPERIENCE OF CSL

Experimental trials carried out by the University of Milan on **BIOSTILGAS®** treated vs. control (untreated) silages for biogas production showed the following advantages during silage fermentation and post-opening time:

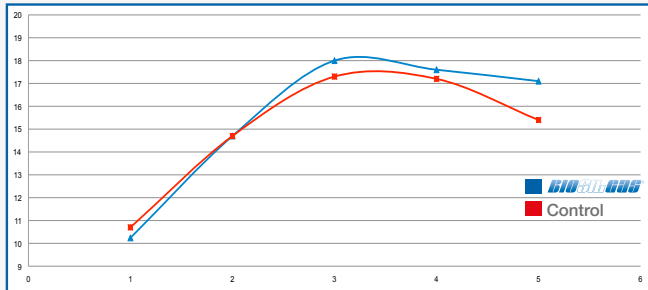
pH in 90gg



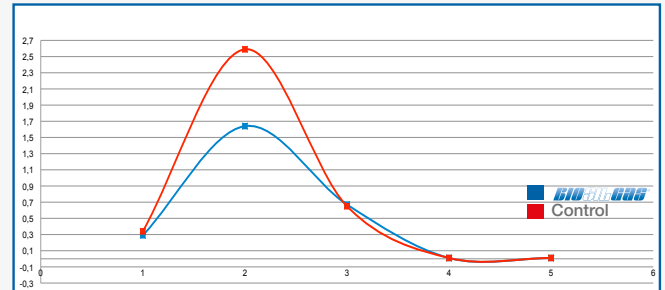
N % in 90gg



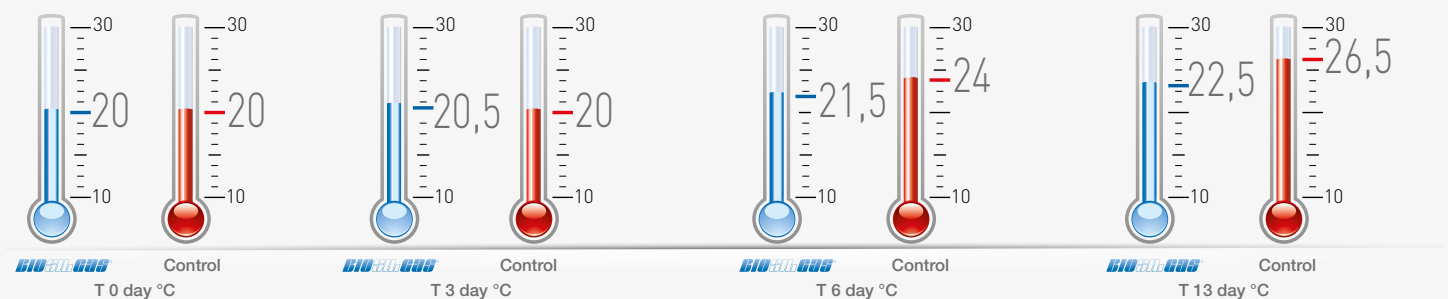
VFAs % in 90gg



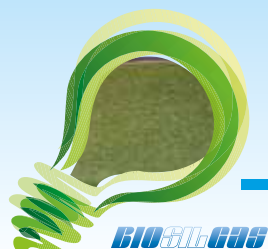
Butyric acid % in 90gg



Temperature
in 13 days post-opening



BIOSTILGAS®
PRESERVES BOTH
MASS AND AVAILABLE
ENERGY!



-10,8



-13,8

Control

BIOFILCHS® adds:

- (+) Fast acidification and availability of silage (pH graph)
- (+) Control of silage fermentation and spoilage stopping
- (+) VFAs to the bacteria in the digester
- (+) Available biomass at the end of ensiling process
- (+) Thermal stability in the open side of the silo: (temperature graph)
- (+) Production of methane per unit of ensiled mass, due to the reduction of losses and the greater availability of carbon sources for methanogenic bacteria.

BIOFILCHS® subtracts:

- (-) Clostridia, ammonia, yeasts and molds (graphs of ammonia and butyric acid)
- (-) Temperature during fermentation and after opening the silo (temperature graph).

BIOFILCHS® multiplies:

- (x) Energy Efficiency
- (x) Economic yield.

BIOFILCHS® A CASCADE OF ENERGY!

**better fermentation
trend**

more stability of silage

less silage losses

**more biomass/bioenergy available
to methanogenesis**

**stabilization
of the methane
yield**



CENTRO SPERIMENTALE DEL LATTE

Brings to the field the best of LAB technology

Thanks to an in depth research activity, CSL is a reference point at international level for the dairy, agro-zootechnical, and pharmaceutical industry. Since 1948 CSL has been isolating, selecting, developing, and producing a range of LAB for every specific field of application..

CENTRO SPERIMENTALE DEL LATTE S.r.l.

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