

Diagnosing silage problems 101

Maxime Leduc for *Progressive Forage*

The quality of silage has a direct impact on animal performance and cost of production; therefore, it is important to know how to diagnose silage problems to apply the correct treatment. Here's what you need to know to self-diagnose silage problems:

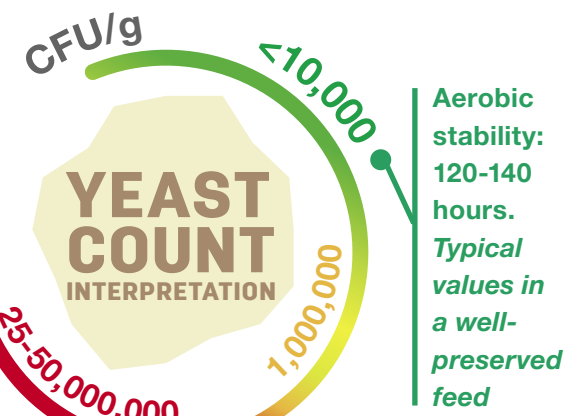
FERMENTATION PROFILE TARGET VALUES

The following can help you understand the forage analysis, which includes the fermentation profile (pH and volatile fatty acids [VFA]). Then based on the results, this data can help diagnose grass, legume and corn silage problems.

Fermentation profile	Preferred range			What is that?	What do I recommend if?	
	Grasses	Legumes	Corn ¹		Too low	Too high
pH	4.5-5.3	4.4-5.3	3.9-4.2	Acidification index. For the same DM content, the lower the pH, the better the fermentation.	Corn: Consider using buffer substances in the ration.	Review the dry matter (DM) for resolution and choice of species. Use an additive.
Total VFAs (% DM)	1.2-6.7	5.3-11.8	2-6	Total organic acids (Lactic + acetic + butyric)	Review the DM for resolution and choice of species. Use an additive.	
Lactic acid (% DM)	1-5	2-7	1-5	Preferred acid produced by good fermentation	Review the DM for resolution and choice of species. Use an additive.	
Lactic in % Total VFAs	56-98	38-65	46-84	In well-preserved silage, lactic acid is more than 65% of VFAs.	Review the DM for resolution and choice of species. Use an additive.	
Acetic acid (% DM)	0.3-2.5	2.0-5.6	0.5-3.0	Should be less than 3%. Increases aerobic stability.	The use of an additive containing <i>L. buchneri</i> leads to an increase in acetic acid.	Review DM to harvest, chop length and silo closing speed. Use an additive.
Butyric acid (% DM)	0.5-0.8	0.1-1.4	N/A	Should be less than 0.3%. Increases when silage is too wet and/or soiled.		Review DM to harvest, chop length and silo closing speed. Use an additive.

¹Conventional corn silage

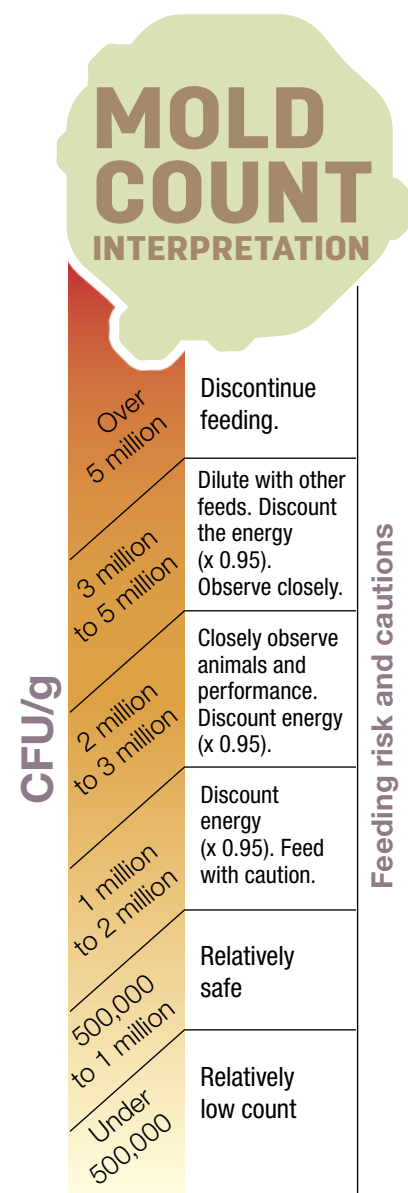
Source: Lactanet



Aerobic stability: <math>< 40</math> hours.
Upper range for inadequately fermented feed

These yeast and mold benchmarks give the thresholds to interpret the results of a yeast and mold analysis in silage.

Source: Dairyland Laboratories



Feeding risk and cautions

MAXIMUM CONCENTRATION THRESHOLDS OF CONCERN (PPM) ON A DRY MATTER (DM) BASIS FOR MAJOR MYCOTOXINS IN DAIRY CATTLE FEED

Mycotoxins	Development stage	Maximum mycotoxin concentration on a DM basis (PPM)
Deoxynivalenol (DON) and its derivatives	Lactation	1
	Calf < 3 months	2
	Calf > 3 months	5
Fumonisin (FUM)	Lactation	30
	Calf > 3 months	30
Zearalenone (ZEA)	Lactation	2-4
	Calf > 3 months	0.5
T2/HT-2	Lactation	0.1
	Calf < 3 months	0.025
	Calf > 3 months	0.025

Source: Lactanet

VISUAL ANALYSIS

Look at the shape and texture of mold. Black dots mean mycotoxins may be present (patulin).

Consequence: Decreased feed intake, affect rumen function

WHITE MOLD

WHITE TO BLUE-GREEN MOLD

Increase risk as it changes from white to blue-green. Neurotoxins, ochratoxins may be present.

Consequence: Decreased feed intake, performance and weight, respiratory problems

RED MOLD

More problematic. Indicates mycotoxins are present such as DON, zearalenone, vomitoxins, etc.

Consequence: Decreased feed intake, diarrhea, affects rumen function, reproductive disorders, bleeding

NOTE!

- If you actually see mold, know there is already a problem.
- Look at the color, the texture, consistency to determine how serious the situation may be.
- Do not feed moldy feed to animals.

OLFACTORY ANALYSIS

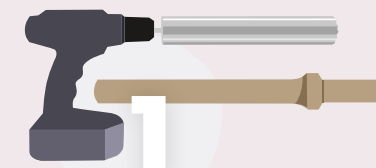
What you smell ...	Why is this happening?	Impact on management
Acid/sweet	Strong fermentation, pH could be low	Aerobic stability issues
Acid/vinegar	High acetic acid Type 1 or 2: ▶ Type 1: High acetic and lactic acids, good stability. No problems, suitable for animals. ▶ Type 2: Low acetate, slow fermentation. Stability problems, low animal performance.	Good stability, low palatability, may cause health and fertility problems
Tobacco/burnt	Silage heated excessively, yeast or bacillus, low VFA, high ADF-CP	Animal palatability, low performance
Fecal/decomposition	Silage with clostridial fermentation, contamination with soil, production of butyric acid, ammonia and amine, and high pH	Possibly too wet
Earthy	Growth of bacillus, high pH	Risk of mold, feed quickly
Fruity, alcoholic & yeast	Presence of yeast, pH increase, presence of alcohol	Silage will heat up, mold, do not feed
Moldy	Mold growth, visible mold, hot silage	Low nutrient value, discard silage

NOTE!

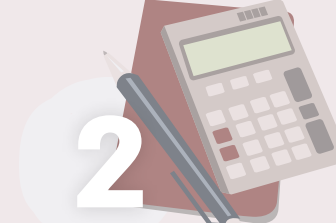
Do not put your nose directly into the silage as there is a risk you can inhale mycotoxins or pathogens and get sick.

ADDITIONAL ANALYSIS

3 methods to collect samples for further analysis:



CORE SAMPLING



CALCULATED METHOD



TEMPERATURE ASSESSMENT

NOTE!

It is recommended to work with a professional when core sampling (due to risk of bunker collapsing/injury/death).

ALWAYS REMEMBER TO:

- Follow the sampling protocol (otherwise, the values you obtain will not be reliable).
- Combine animal observations with your test results.
- Perform frequent forage analysis.
- Use more than one diagnostic tool.

Maxime Leduc, agr., Ph. D. is the creator of "Let's Talk Forage Systems" webinar and quiz series and can be reached at maximeleduc@gmail.com For more information on this topic, visit [youtube.com/watch?v=eIYPWrM3b0](https://www.youtube.com/watch?v=eIYPWrM3b0)

References omitted but are available upon request.