

High risk of stuck fermentation!

This vintage unusual weather conditions have lead to a great deal of concomitant and interacting causes for stuck fermentations

- **Highly concentrated musts, high potential alcohol.**
- **Low acidity, high pH involving a low SO₂ efficiency and a risk of indigenous yeast and bacteria development**
- **Low nitrogen concentration in must.**

These factors can be aggravated by

- **Indigenous yeast development.**
- **Insufficient yeast population due to improper rehydration or low inoculation rate.**
- **High chlorine content in tap water.**

Always keep in mind that yeast is a live organism that requires care and attention especially in hostile conditions. With extra caution all the way through the wine-making process, risks of experiencing stuck fermentations can be minimized. This document, we will guide you step by step through fermentation till complete sugar consumption and if you are already facing an arrested or dangerously sluggish fermentation we can still assist you to restart!

Preventive treatment

- **Minimize microbial spoilage and wild yeast development.**

SO₂ inhibits unwanted wild yeast, kills spoilage bacteria and prevents browning.

After addition, allow time for the sulfite to bind with components, reducing free active SO₂ before yeast inoculation.

Warning : Free SO₂ is the only efficient form, (10 to 50% of the total SO₂).

- **Adjust the Free Assimilable Nitrogen content.**

To complete fermentation in healthy condition, you should target 200 to 400 ppm FAN (Free Assimilable Nitrogen).

Nitrogen requirements vary with yeast strains as well as must conditions, the higher the potential alcohol, the higher the FAN should be. DAP provides a good nitrogen source but does not contain any essential nutrients.

Maxaferm® provides thiamin to support yeast growth and inactivated yeast. The chosen inactivated strain contains high levels of ergo- and zymo- sterols, trehalose and glutathion which increase yeast viability.

Recent studies using Maxaferm® showed that not only it proved to be very efficient to complete fermentation, but also helped reduce volatile acidity and off flavors production. Maxaferm® can be used on all musts, red or white to achieve high quality wines.

Warning: A FAN analysis is only accurate before fermentation. During the primary stages of fermentation yeast takes up nitrogen resulting in a dramatic FAN decrease.

- **Select an appropriate yeast strain**

Select a strong strain.

In order to minimize fermentation problems, choose a strain with high alcohol tolerance and preferably a short lag phase.

Production process.

Production processes can influence yeast resistance and viability. DSM produces and dries yeast with a specific production process that guarantees high reserves of vitamins and cofactors to offer highest viability after rehydration.

- **Create a sufficient population**

Use the right dosage

Most fermentation should start with an inoculation of 3 - 4 million viable yeast cells per milliliter of must.

A normal healthy fermentation will reach the stationary phase with a cell population up to 100 million viable yeast cells per milliliter. This can be achieved by using 20 g/hl (1,7 lb /1000G). At this stage a thiamin addition will ensure healthy yeast growth.

Ensure high viability

Adding the recommended quantity of yeast is not sufficient to guarantee the targeted population. The yeast are delivered to you in a dried state, restoring their activity requires a rehydration phase which can be very traumatic. Adding the yeast starter to the tank can also be detrimental if the yeast population suffers a great temperature difference.



Yeast rehydration, a critical step!

Yeast viability and thus fermentation success relies for a great part on yeast rehydration conditions.

During the first few minutes of rehydration, some of the components of the yeast are going from a dry crystalline form to a gel like state. At low temperatures (under 20°C, 68°F) the transformation from crystalline to gel is less successful. Cell walls become porous and cause a loss of cytoplasm. Rehydration in 15°C (60°F) water can result in a loss of 60% of the yeast viability. Yeast viability loss is also observed for temperatures above 40°C (105°F). Rehydration in distilled or deionized water is lethal to the yeast. The cell walls and membrane require the presence of some minerals, sodium, calcium, magnesium and or potassium, during rehydration.

Tap water at 250 ppm hardness is optimum. Most tap water has enough hardness to do the job.

Rehydration in a 5% sugar solution (50 g/l) offers optimum conditions to restore yeast activity and avoid osmotic shock.

Avoid temperature shock

To avoid a temperature shock, gradually lower the temperature of the rehydrated yeast starter by adding must in several steps until the temperature of the final must is reached.

Warning: Avoid using must with high levels of SO₂ (above 20 ppm).

The yeast should be incorporated as soon as possible after the rehydrating phase has been completed.

Preserving yeast viability in the course of fermentation

At mid fermentation d1040 (16 to 14 Brix) a pumping over with air along with a second nutrient addition will provide the yeast with vital oxygen and replenish its sterol content to prevent problem fermentation.

Note: At this stage oxygen doesn't affect wine aroma and there is no risk of oxidation

DSM ADVICE

■ Before fermentation add 50 ppm of SO₂.

■ Maxaferm® in combination with DAP.

The addition of 15 g/hl (1 lb/1000 G) of Maxaferm® will provide 14.4 ppm Nitrogen (10.2 ppm. from DAP and 4.2 ppm from Amino Acids, peptid and protein). In the 4.2 ppm fraction Amino acids are the only form directly absorbable by yeast. Add half of the requested quantity at yeast inoculation and the other half at mid fermentation d1040.

■ Use 20 grams per hectoliter of must of an alcohol tolerant strains with a short lag phase.
White wines: Fermicru® LVCB, Fermicru® 4F9, Fermicru® LS2, Fermicru® AR2, Anchor® VIN 13, Anchor® NT 116,

Red wines: Fermicru® VR5, Fermivin®, Anchor® NT50, Anchor® NT112.

Rehydration guide line is given at the back of the product application sheets (available from our web site www.dsm-oenology.com).

Re-starting a stuck fermentation

■ Detoxify the must

An arrested wine contains yeast inhibitory substances such as saturated C₈ - C₁₀ fatty acids. In order to successfully restart inhibitors must be removed before adding fresh yeast. An addition of yeast hulls, with a pumping over to increase contact with wine, will allow to remove inhibitors that affect yeast membrane permeability. After 24 hours rack the lees off the wine before adding fresh acclimated yeast.

■ Fermichamp® can do the job!

As a result of the photosynthesis must sugars consist of approximately 50% glucose and 50% fructose. During fermentation, *Saccharomyces cerevisiae* metabolises preferably glucose. The consequence of this preferential consumption is that fructose becomes predominant during fermentation : close to 75% of the remaining sugars at mid-fermentation and close to 95% towards the end of fermentation. Restarting stuck fermentations becomes an issue since most enological yeast strains have a low capacity to metabolize fructose. Selecting a strain solely on its high alcohol tolerance is therefore not sufficient to ferment to dryness.

Fermichamp® not only can ferment up to 17% alcohol but is also fructophile which make it the ideal strain for the job!

■ Re-hydrating Fermichamp®, accustoming it to alcohol

Obviously, the same attention applies when rehydrating Fermichamp® than other yeast. The extra parameter is that when restarting a stuck fermentation the yeast must be accustomed to the hostile conditions, i.e. alcohol concentration.

■ Adding nutrients

Adding nutrients to a stuck or sluggish fermentation requires extra attention as Nitrogen might be used by unwanted micro organism and lead to wine spoilage!

Always add nutrients after re-yeasting!

DSM ADVICE

■ Add yeast hulls to the stuck wine with a pumping over. Leave for 24 hours.

■ Rack off the lees along with a light sulfiting (If the stuck fermentation occurs on reds, press before reyeasting).

■ Re-inoculate with Fermichamp® at 30 to 50 g/hl (3 to 4 lb/1000G).

■ Maxaferm® at 25 g/hl (2 lb/1000G).

Restarting guide line given at the back of the Fermichamp® product application sheet, available from our web site.