TECHNICAL BOOKLETS

GOOD MLF MANAGEMENT

LAFFORT

l'œnologie par nature

1- Why manage MLF ?

Good MLF management requires requires perfect control of the microbiological status of the wine.

To this end, winemakers should first ensure a smooth alcoholic fermentation (AF) (see the Laffort technical booklet "Good management of nutrition and fermentation aids"). Indeed, if the AF is sluggish, the *Saccharomyces* yeasts will produce compounds that inhibit the growth of lactic acid bacteria (LAB), and the non-*Saccharomyces* yeast populations (mainly *Brettanomyces*) can grow, thus affecting the growth of LAB and the organoleptic quality of the wine.

To avoid the colonization of the medium by spoilage micro-organisms, it is necessary to reduce the lag phase between AF and MLF as much as possible: the earlier the wine is stabilized, the lower the risk of growth of unwanted microbial populations.

2- What are the key criteria for MLF ?

It is necessary to carefully consider the course of MLF as early as possible after the completion of the AF. To this end, two activities have to be performed before inoculation: an analytical assessment and a microbiological diagnosis.

2-1 Assessment of the microbiological status of the wine

The microbiological analysis reveals the cell density of the LAB population and detects the possible presence of spoilage microorganisms, specifically *Brettanomyces*. Two methods are available to perform this analysis:

- Epifluorescence microscopy which allows measurement of the viable LAB population and assessment of the possible presence of spoilage microorganisms, such as *Brettanomyces*, in one step and in only a few hours.
- Cultivation on specific solid media (refer to the technical sheet on cultivation media from Sarco) which allows enumeration of the microorganisms in a period of days: 11 days for the LAB and 7 days for *Brettanomyces* yeasts.

When should the microbiological analysis be performed?

It should be carried out before LAB inoculation, upon devatting.

2- 2 What analytical assessment is necessary ?

The analytical assessment performed at the end of the AF has to provide the data to identify the potential critical parameter(s) for the a smooth MLF. Particular attention has to be paid to the following parameters: Alc. (vol), pH, free and total SO_2 levels.

3- How to adapt bacterial inoculations ?

3-1 According to the microbiological status of the wine

Microbiological status	Consequences	Action(s) to be implemented
LAB > 10^5 cells/mL	Spontaneous MLF expected	No LAB inoculation (except for cases of recurring sanitary problems: indigenous spoilage flora)
LAB < 10^4 cells/mL	- lag phase before onset of MLF - Risk of spoilage	LAB inoculation is required to reduce the lag phase
Presence of *Brettanomyces*	- Risk of spoilage (volatile phenols) - Risk of lag phase before the start of MLF	According to the population level and the analytical assessment: - Microbiological controls (low population levels) - Physical treatment to eliminate *Brettanomyces* (flash pasteurization, filtration, centrifugation) followed by LAB inoculation

3-2 According to the analytical assessment of the wine

Recommendations for the application of LAB from the **LAFFORT** range

Analytical assessment	Selection of the inoculation method	
	450 PreAc	SB3 Instant
Alc. (% vol.)	> 14,5	< 14,5
pH	> 3,2 *	> 3,3
Free SO_2 (mg/L)	< 5 **	< 5 **
Total SO_2 (mg/L)	< 50	< 30

In the case of particularly difficult wines (eg. pH < 3.2 or total SO_2 > 50 mg/l) it may be prudent to use Standard-type starters.
** It is preferable to keep free SO_2 concentrations as low as possible and in any case below 10 mg/L.
The 450 PreAc bacteria are acclimatized to the wine to be inoculated over a period of 24 hours, and thus are more resistant to limiting conditions. These bacteria display better survival rates after inoculation into “difficult” wines.

3-3 Considerations for the starter choice

	"Preventive" approach: for a well managed MLF (post AF period, draining/ vatting)	"Curative" approach: spontaneous FML did not occur
1	Check the microbiological analysis and implement corrective measures, if necessary	
2	Depending on the physiochemical parameters, 450 PreAc or SB3 Instant (see table above). (see table above)	Verify the analytical assessment. If possible, correct the identified limiting factor(s). Use 450 PreAc

4- What are the key factors for a successful MLF?

Fermentation management

Smooth MLFs generally follow smooth AFs (see the Laffort technical booklet "Good management of nutrition and fermentation aids").

LAB nutrition

Growth and survival of LAB depend on the presence of assimilable nutrients. Possible deficiencies are avoided by the addition of an activator (Malostart for bacteria for direct inoculation; Energizer is supplied together with the 450 PreAc bacteria).

Temperature

20°C is the optimal temperature, and it must be kept constant. Beware of variations caused by thermostats.

Closely follow the protocol for the utilization of lyophilized LAB

The efficiency of the starters is optimal if the protocol for their utilization is strictly followed. It is particularly important to keep to the recommended temperatures and durations of each step.

Wine detoxication

The wine may contain LAB inhibitors. Amongst these, medium-chain fatty acids of yeast origin inhibit bacterial growth and also malolactic activity. They can be removed by adsorption to yeast cell walls. Malostart (for bacteria for direct inoculation, such as SB3 Instant) or Energizer (for 450 PreAc bacteria) must be used in such cases.

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