MLF RESTART PROTOCOL

Problems regarding malolactic fermentation (MLF) in wine can have different origins:

- Competition from residual yeasts.
- Wine toxicity: the presence of inhibiting compounds (ethanol, SO_2, medium-chain fatty acids).
- Bacterial deficiency.
- Low level of nutrients necessary for the bacteria.

For each of these situations, there is a strategic approach:

1- DECREASE COMPETITION WITH RESIDUAL YEASTS

In order to eliminate the yeasts, there are different techniques like racking, filtration (1 µm) or flash-pasteurization. For *Saccharomyces*, racking is recommended. In the case of *Brettanomyces*, it is better to use a more secure method like filtration or flash-pasteurization. In all cases, once the yeasts are eliminated, it is important to add the selected bacteria soon, in order to rapidly colonize the wine.

2- DETOXIFY THE MEDIUM

To eliminate the molecules inhibiting lactic acid bacteria, yeast hull (**BIOCELL®** 200 to 400ppm) addition during an anaerobic circulation is the most efficient treatment. This must be done 24 to 48 hours before the bacterial addition, continuously if possible, in order to optimize their survival rate.

3- USE A RELIABLE BACTERIA PREPARATION

Bacterial strains have differing levels of resistance to difficult wine conditions depending on their individual genetic profiles. **LACTOENOS 350 PREAC®** is one of the strongest strains available, especially for its resistance to medium-chain fatty acids.

4- ACTIVATE THE BACTERIA

When the wine has a notably low nutrient content, **MALOSTART®** addition is recommended after the bacterial inoculation to provide essential nutrients for increased malolactic activity.

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PROTOCOL FOR MLF RESTART

All aforementioned situations are linked: when residual yeasts are active after primary fermentation (*Saccharomyces* or *Brettanomyces*), they tend to consume any remaining nutrients and produce compounds toxic to bacteria. An efficient restart MLF protocol will therefore combine the following strategies:

STEP 1:

Rack/centrifuge anaerobically.

Note: if *Brettanomyces* population is higher than 10^3 cell/mL, filter the wine (1 µm).

STEP 2:

Add **BIOCELL®** (200 to 400 ppm).

Mix wine anaerobically every 12 hours for 48 hours, or continuously if possible.

STEP 3 (48 hours after BIOCELL® addition):

Inoculate with **LACTOENOS 350 PREAC®** and homogenize anaerobically.

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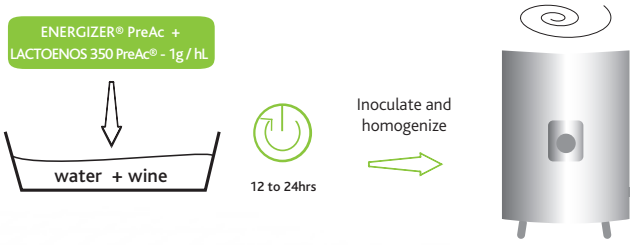
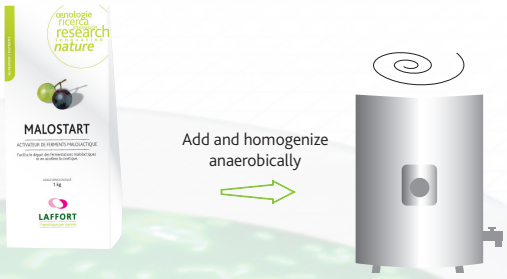


STEP 4:

Add **MALOSTART®** (200 to 400 ppm).
Homogenize anaerobically.



Important: maintain a stable temperature, between 18°C and 25°C / 66F-75F, during all stages and until the end of MLF.

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