Traditional Method by Laffort
Keys for succes

- Grapes
- Harvest
- Pressing
- Must preparation
Base wine

1st Alcoholic Fermentation

Malo-lactic Fermentation

Blending

Proteins and tartaric Stabilization
Prise de mousse.

- 2ndary AF = PDM
- Yeast starter preparation
- Tirage mixture preparation
- Riddling
- Disgorging
When drinking traditional method (TM), What are customers looking for?

- Elegance
- Finesse
- Freshness
- Complexity

Directly linked to the winemakers choices:

- Grape varietal
- Ripeness
- Aging potential
WHITES:
Chardonnay
Pinot blanc
Pinot Gris
Aligoté, Auxerrois
Riesling, chenin
Macabeo, Xarello
Malvasia, Parellada
Rakatsiteli, Ribola
Furmint, Sipon
Sauvignon blanc
Muskateller...

Caution for TM: certain varietals such as Riesling, Chenin have much different aging potential and therefore the « on lees » management needs to be adjusted to the style targeted.

REDS:
Pinot Noir
Pinot Meunier
Mouvèdre
Trepa
Blaufrankisch
Zametna Crnina
Cabernet Franc
Syrah...

Grapes
Ideal maturity:

Alcohol: 9 to 11%vol max
Sugar: 150 to 185 g/l
TA: 7 to 10 gH$_2$SO$_4$/l (10 to 15 gTH2/l)
pH: 3,00 to 3,15
Malic Acid: 3 to 5 g/l
Polyphenols: doesn’t matter

Calculation of the maturity index (MI) for an ideal sugar/acid balance:

$$MI = \frac{\text{Sugar} \ g/l}{\text{TA} \ gH_2SO_4/l} \ \text{between 20 and 25}$$

Ex: $MI = \frac{179,8}{8,2} = 21,9 \ \text{harvest decision}$
Maturity Index: the example of Champagne.

(Avize, Côtes des Blancs, lycée viticole de la Champagne)

<table>
<thead>
<tr>
<th>Vintage</th>
<th>Sugar g/L</th>
<th>Potential Alcohol %Vol.</th>
<th>TA g/L H₂SO₄</th>
<th>Maturity Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>177</td>
<td>10,5</td>
<td>6,1</td>
<td>29</td>
</tr>
<tr>
<td>2004</td>
<td>172</td>
<td>10,2</td>
<td>7,5</td>
<td>23</td>
</tr>
<tr>
<td>2005</td>
<td>168</td>
<td>10</td>
<td>7,2</td>
<td>23</td>
</tr>
<tr>
<td>2006</td>
<td>168</td>
<td>10</td>
<td>6,85</td>
<td>25</td>
</tr>
<tr>
<td>2007</td>
<td>160</td>
<td>9,5</td>
<td>8,5</td>
<td>19</td>
</tr>
<tr>
<td>2008</td>
<td>163</td>
<td>9,7</td>
<td>8,8</td>
<td>18,5</td>
</tr>
</tbody>
</table>
Warning

These parameters correspond to ripe grapes and not grapes harvested before ripeness.

Any kind of green flavour/character must be strongly avoided as it would definitely alter the quality of the future sparkling wine.

The effervescence of the wine is a flavor enhancer and amplifies by 30% the aromatic perception, positive but also negative.
TM requires a selection of juices!
Must be organised in order to extract a minimum quantity of the compounds coming from:

- Peripheric Area
- Central Area
- Stem
- Seeds

Harvest
Transport
Press loading
Pressing
Hand picking

Small boxes
ideal = 50kg max and perforated

Fast transport and fast loading of the press
Optimum conditions:

- **Whole clusters pressing** (ease the draining of the juices in the press and limit the skin maceration)

- **Direct loading of the press.** Grapes and berries must be intact prior to the pressing cycle.

This process allows to avoid the extraction of undesirable compounds outside of the intermediate area of the berries:

- Coloring matter
- Oxydisable polyphenols
- Lipidic compound « antifoam ».
The pressing cycle aims to separate the juices of the pulp from the other areas:

The principle is to apply and maintain low to medium levels of pressure required for the flow of the juice avoiding any maceration phenomenon.

Fractioning of the different juices according to their quality.

Source: Revue Française d’Œnologie N°153
Fractioning is crucial in TM

The self-pressing juice corresponds to the rinsing of the blemishes and wax to the surface of the grapes. These compounds are extremely harmful to foam quality: This juice must be separate from the others.
Fractioning is crucial in TM
Fractioning is crucial in TM

(source: G.Blank, M. Valade, le vigneron champenois)
If you improve your fractioning, you will tailor your treatment to remove phenolics and subsequently improve your quality.
In case of sanitary degradation of the crop, the usage of Tanin Galalcool (5g/hl) in the press pan can reduce by 50% the laccase activity.

(source: G.Blank, M. Valade, le vigneron champenois)
The TM musts are very complex

Very sensitive towards phenolics: oxydized and oxydisable

Sensitive to coloration (blanc de noir).

Maximize the foam quality.
Give the wine its personnality

The best practice in sparkling winemaking is to always apply treatments as far from the end product as possible:

It is less traumatizing to treat a must with 200g/hl of bentonite than to treat a base wine with 20g/hl of the same bentonite.

(A. Maujean et al, 1990)
Phenolics impacts on base wine

Base wine Pinot Gris, RSA 2010

Post fermentation vs prefermentation treatment

Wine 1 – Without fining
Wine 2 – Fining with the Polymust Press 30g/hl after fermentation
Wine 3 – Fining with Polylact 30g/hl on presses juice
Wine 4 – Fining with Polymust Press 30g/hl on presses juice
Foam quality is crucial to satisfy Customer quantity, finesse, durability

- Protein from vegetal origin
- Macromolecule from yeast origin = mainly high molecular weight mannoproteins

(Ferreira et al., 2000; Dupin et al., 2000; Dambrouk et al., 2004).

- Lipids
- Fatty acids

(Gallart et al., 2002; Dusseau et al., 1994).
The elaboration of a sparkling wine has a variable number of vinification stages that can significantly alter the macromolecular composition of the wine.

In particular, fining treatments, including those using casein or bentonite, are likely significantly affect the composition of a wine and thus to play down the foaming properties (Maujean et al., 1990).

The timing of treatment to remove phenolic is crucial.
Contribution à l'étude des protéines des moûts et des vins de Champagne Détermination de leur origine. Etude d'une glycoprotéine majeure, l'invertase de raisin. PHD thesis Thierry Dambrouk, univ Reims 2004

<table>
<thead>
<tr>
<th>WINE</th>
<th>Hm (mm)</th>
<th>Proteins (µg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>113</td>
<td>10,8</td>
</tr>
<tr>
<td>Bentonite 100ppm</td>
<td>98</td>
<td>8,85</td>
</tr>
<tr>
<td>Bentonite 400ppm</td>
<td>76</td>
<td>5,5</td>
</tr>
<tr>
<td>Bentonite 500ppm</td>
<td>60</td>
<td>3,02</td>
</tr>
</tbody>
</table>

Wine fining influence on « foam-ability » and total proteins (treatment on must and measure on base wine)

<table>
<thead>
<tr>
<th>MUST</th>
<th>Hm (mm)</th>
<th>Proteins (µg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>113</td>
<td>10,8</td>
</tr>
<tr>
<td>Bentonite 100ppm</td>
<td>82</td>
<td>6,31</td>
</tr>
<tr>
<td>Bentonite 400ppm</td>
<td>88</td>
<td>3,42</td>
</tr>
<tr>
<td>Bentonite 500ppm</td>
<td>108</td>
<td>3,31</td>
</tr>
</tbody>
</table>

Must fining influence on « foam-ability » and total proteins (treatment on must and measure on base wine)
The timing of treatment to remove phenolic is crucial.

Preventive treatment on the must during cold settling.
Adapte the treatment to the grape varietal, its phenolic maturity and content:
In case of mould or botrytis:

- **POLYMUST PRESS**
  - Pinot Noir
  - Pinot Gris
  - Sauvignon
  - Riesling
  - Chardonnay
  - Cuvée (20g/hl)
  - Cuvée (80g/hl)

- **CHARB. ACTIF + GR**
  - T1
  - T2
  - Cuvée
  - T1
  - T2
  - 20g/hl
  - 60g/hl
When pectine test is positive add finning agent (Polymust Press / Charbon Actif Plus GR)

Cold settling 6 à 12 h
60 à 140 NTU

Racking off and yeast inoculation.
(better lees compaction)

3% of lees!
Base wine.

1st Alcoholic Fermentation
Malo-lactic Fermentation
Blending
Protein and tartaric Stabilization
Choice of ADY according to the style of sparkling

Quick stock rotation, short aging

Specific Yeasts strain selected for its capacity to reveal varietal aromas.

Long stock rotation, long on lees aging

Neutral Yeast strain (Champagne isolate).

Avoid any development of varietal and 2ndary aromas.
NUTRITION IS ESSENTIAL AS MUSTS ARE VERY CLARIFIED (target 150mg/l YAN)

30g/hl

+ 20g/hl

20g/hl

or
2 Strategies

Non MLF

- Quick racking off after AF
- SO$_2$ correction
  Total 65 ppm (max)
  Free <15 ppm
- Lower temperature down to 10°C

MLF

- LACTOENOS B16
- when pH<3.1
- Inoculation protocol on must at the end of AF or on wine without racking.
- Temperature 20°C.
**LACTOENOS® B16 STANDARD** Strain *Enococcus aeni* selected in Champagne.
- Strain very resistant to low pH characteristic from base wines (2.85 < pH < 3.1).
- Adaptation to the wine condition is required.

### Reactivation
**20 L**
- MUST (2nd press fraction: Taille)
  - Sulfited ½ the dosage
  - 10 L
- 10 L WATER (without chlorine)
  + 2 doses ENERGIZER®
  - Deacidify with K Bicarbonate until pH = 3.3
  - Final T°C: 22°C
- LACTOENOS® B16 STANDARD: 2 doses of 50hL
- ZYMAFLORE® SPARK
  - 10 g = 0.5 g/L

### Build up Culture
(to start the same day as the reactivation)
**5 hL**
- Must not chaptalized
- Sulfited ½ the dosage
- 5 hL (5% of the total volume to inoculate)
- Deacidify with K Bicarbonate until pH = 3.3
- 40 g/hL of MALOSTART®
- Maintain the temperature at 22°C
- ZYMAFLORE® SPARK (rehydrated 20 min in hot water 35°C)
  - 250 g = 0.5 g/L
- Control malic acid at inoculation and 3 days after

### Tank
**100 hL**
- 100 hL of wine
- Fermenting or at the end of AF
- 20 g/hL of MALOSTART®
- Maintain temperature at 20°C until MLF is finished
Base wines will be stabilized **after blending only.**

### Protein stability

- It is imperative to check the protein stability of wines
- Stabilization with sodium **bentonite**.
- Harmful practice regarding foaming properties but necessary!
- It is possible to rebuild your foaming properties during tirage with specific mannoproteins.
Base wines will be stabilized after blending only.

**Tartaric stability**

- Tartrate crystals are problematic at riddling, disgorging and at the opening by the consumer.

- Classical cold stabilization.

- Electrodialysis (particularly recommended for high pH base wine).

- CMC at tirage
Prise de mousse.

- 2ndary AF
- Yeast starter
- Tirage mixture
- Riddling
- Disgorging
2ndary AF Target:
Transform a dry base wine into a sparkling wine with 6 bar of over pressure at 10°C.

2ndary AF ≠ from AF:

- Restart of AF
  - Alcohol ≈ 11%vol
  - pH ≈ 3
  - SO₂ ≈ 50 mg/l
- Fermentation in close environment
  - Increase of [CO₂] concentration up to 12 g/l
  - Impossibility to stir the yeast in suspension

2ndary AF Kinetic in bottle:

- ≈ 45 jours
- The yeast population will rise first and then stabilize
- The yeast multiplication stops at about 3 bar, way before the full sugar consumption: the alive yeast population is capital.
The level of yeast population achieved in the bottle once the cellular growth stops is the key factor to manage the 2ndary AF. This population varies according to:

1) **The ferment-ability of wines**: Yeast nutrition is capital.

2) **The temperature**: when the T°C is low, the 2AF kinetic is slow because the cellular multiplication depends on temperature: T°C advised: 15°C to 18°C

<table>
<thead>
<tr>
<th>T°C</th>
<th>12°C</th>
<th>15°C</th>
<th>20°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max pop in bottle (10⁶ lev/ml)</td>
<td>7,5</td>
<td>10,5</td>
<td>12,5</td>
</tr>
</tbody>
</table>

3) **The quality of the yeast starter**: The yeast strain
The physiologic state of the yeasts and their level of acclimatization.

**Yeast starter**: 50 à 60 .10⁶ cell/ml
# YEAST STARTER FOR TIRAGE

**Classic & Charmat method**

<table>
<thead>
<tr>
<th>Client:</th>
<th>Cuvée/blend:</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIRAGE DATE: 1-janv</td>
<td>Number of Tirage day: 1</td>
</tr>
<tr>
<td>TIRAGE OF 1000 hL OF BASE WINE</td>
<td></td>
</tr>
</tbody>
</table>

- with **3 % OF YEAST STARTER** = **3000 L**
- with **10 g/hL OF ZYMAFLORE** = **10 kg**
- with **580 L OF LIQUOR FOR TIRAGE**

LIQUOR CONCENTRATION = **500 g/L**
### Yeast Preparation

<table>
<thead>
<tr>
<th>Day</th>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>27-déc</td>
<td>First</td>
<td>13 kg of DYNASTART/SUPERSTART in 200 L of water at 35°C/38°C.</td>
</tr>
<tr>
<td></td>
<td>Second</td>
<td>10 kg of SPARK or XS in 200 L of DYNASTART/SUPERSTART at 35°C/38°C.</td>
</tr>
</tbody>
</table>

Stir vigorously and leave it for **20 min** then stir it again to homogenize properly before going to the yeast acclimatization phase.
### ACCLIMATIZATION OF THE YEAST PREPARATION

<table>
<thead>
<tr>
<th>DAY:</th>
<th>27-déc afternoon</th>
<th>6 to 12 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L of DRY YEAST REHYDRATED</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>L of BASE WINE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>120</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>L of TIRAGE LIQUOR</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>180</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(concentration: 500 g/L or 90 kg of sugar)

Total 500 L

The mix must be adjusted at 20°C

Mix the blend actively and check its initial specific gravity. The drop of specific gravity will tell you about the yeast activity. The cell multiplication will occur after 6 to 12 hours when the mix specific gravity will be around D=1010. (It is crucial to not go below D=1005 at this stage).
## FIRST YEAST MULTIPLICATION

<table>
<thead>
<tr>
<th>DAY:</th>
<th>28-déc Morning</th>
<th>2 days</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maintain the mix at 20°C</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500 L of YEAST ACCLIMATIZED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>255 L of BASE WINE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 L of LIQUOR (concentration 500 g/L or 50 kg of sugar)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>145 L of water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 g of Thiazote PH</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1000 L</td>
<td></td>
</tr>
</tbody>
</table>

- **Aerate 3 to 4 times/day (40 mg O2/L/day)**

Follow up the sugar degradation in tracking specific gravity. The sugar degradation must be 25g/L/day in yeast activity's, that represent around 6 to 12 unit of specific gravity per day. Caution, the yeast starter must always be above 1005 during the elaboration of the protocol.
SECOND YEAST MULTIPLICATION:

<table>
<thead>
<tr>
<th>DAY:</th>
<th>30-déc Morning</th>
<th>2 days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1000 L of YEAST BUILD UP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1200 L of BASE WINE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>300 L of LIQUOR (concentration 500 g/L like 150 kg of sugar)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>500 L of water</td>
<td></td>
</tr>
<tr>
<td></td>
<td>300 g of THIAZOTE PH</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total 3000 L</strong></td>
<td></td>
</tr>
</tbody>
</table>

Follow up the sugar degradation in tracking specific gravity. The sugar degradation must be 25g/L/day in yeast activity's, that represent around 6 to 12 unit of specific gravity per day. Caution: the yeast starter must always be above 1005 during the elaboration of the protocol.

The yeast starter is ready when the specific gravity is close to 1000 - 1005. It is mandatory to proceed then to a microscope counting of the population which should be around 40 to 60 million cells/ml in the yeast starter. **The minimum inoculation rate in the base wine must be $1.5 \times 10^6$ cell/ml.**
Certification **CIVC** for **Zymaflore Spark**

**Range SPARK 2015**

Strengthen our leadership in terms of product quality in the sparkling world
1) **Liquor:** 6 bar of over pressure at 10°C = tirage mixtion at **24g/l of sugar.**

Simplified calculation of the «Tirage point»:

\[
\text{[sugar] to add in base wine} = \text{[sugar] mixtion} - \text{[sugar] wine} - \text{[sugar] yeast starter}
\]

2) **Yeast starter:** 50 to 60 \(10^6\) cell/ml at 3%

3) **Nutrition:** Thiazote PH at 10g/hl

4) **CLEANSPARK:** 80 ml/hl or (6g/hl for the powder form)
Tirage supplements

**Tartaric stabilization:** Celstab 100ml/hl max. Incorporate in base wine at least 3 days before starting the tirage mixture.

**Restoration and improvement of foaming properties:** Mannolees to be added to the tirage mixture.

**Accelerator of aging on the lees for early disgorgement:** Oenolees 10g/hl to add to the tirage mixture.
Principle of riddling

Eliminate the deposit in the bottles after the PDM

Composition of the deposit:
- 95% Yeast
- Non soluble products
- Riddling adjuvant
The yeasts

The electric charge at the surface of the glass is opposite to the one of the yeast cells.

It leads to the formation of a “dry matter” that is incrusted in the glass.
Yeast will then stick to the glass.
Role of adjuvants

- Coat the yeast to isolate it from the glass and allow their sliding motion to the neck of the bottle and thus facilitate their elimination.
- Allows to have a wine perfectly clear, clean.
Riddling adjuvant impact

With CLEANSPARK

Without CLEANSPARK
The riddling adjuvant

• **CLEANSPARK:** specific blend of bentonite /alginate dedicated especially for automatic riddling cages (Gyropalette)

• Perfect results with manual riddling.

Always incorporate cleanspark in the base wine ready for bottling (with sugar and yeast). Maintaining agitation once added is extremely important during the entire tirage run.
• **Cleanspark Bento alginates**: The most effective adjuvant for riddling, manual or automatic, BUT BE CAREFUL when using (dose and form of application)

**Dosage**
- According to the final population (10 mL/hL every $1 \times 10^6$ cel/ml)
- If dosage is low: bad coating and the “free yeast” will stick to the glass
- If dosage is too high, risk of high deposit volume.

**Addition**
- Dilute 3 times its volume with cold water before adding it slowly with a Venturi to the vessel (Wine + yeasts).
- Stir the tank throughout the entire tirage run.
- If the addition is direct in the tank, there will be a coagulation of alginate. It will form three layers of precipitate. Very difficult to remove

**Never shake the bottles before starting the riddling program.**
Manual disgorging
- Frozen bottle neck
- “à la volée”.

Inox 1.4462

Inox 1.4301
Addition of expedition Liquor

• Brut nature: no dosage < 3g/L R.S.
• Extra Brut: 0 to 6g/L sugar
• Brut: sugar < 15g/L
• Extra Dry 12 to 20g/L sugar
• Dry: 17 to 35g/L sugar
• Half dry: 33 to 50g/L sugar
• Sweet: > 50g/L sugar
### Liquor preparation

- **SO$_2$ free**: 10 to 15 mg/l
- Ascorbic acid
- Metatartaric acid: Polytartryl
- Citric acid
- Sorbic acid
- Arabic gum: Stabivin
- Tannins: Quertanin Sweet, Tanfresh.
- Mannoprotein: Oenolees MP

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**Any addition at disgorging requires trials**
Thank you