



Dialogue on Risk Management in Wine Trade

5-6 November, 2012 - Auckland, New Zealand

Session 1: Wine and Risk The Winemaking Process

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“Wine is the most healthful and most hygienic of beverages.”

Louis Pasteur (1822-1895)



Presentation Overview

- Leaving the discussion of the health benefits of wine aside, focus will be on the “hygienic” aspects of winemaking, i.e. the alchemy of fermentation or the conversion of grapes to wine
- Overview of the white wine making process
- Overview of the red wine making process



Wine is made in the Vineyard

- Prior to harvest and winemaking, grapes are tended and treated according to the style + quality of wine desired
- Fertilizers, herbicides or pesticide sprays stopped several weeks prior to harvest
- Winemaking practices also influence the style + quality of the final product and can be hands on or off



Wine is made in the Cellar

- Major element of winemaking is the fermentation process: yeast transforms the sugar in the grapes into alcohol, carbon dioxide and water
- Yeast + sugar (in the grapes) = Alcohol + carbon dioxide
- To eliminate spoilage or bacterial contamination, grapes should be free of rot + winemaking equipment (tanks, hoses, pumps, filters) must be clean + sterilized
- Alcohol and naturally-occurring SO₂ acts as an antioxidant and microbicide, to prevent unwanted microbial growth, oxidation, off flavours and aroma
- SO₂ is also added and one of the most important additions in winemaking



Regulation and trends in Winemaking

- Wine laws exist in most wine-producing countries to outline + regulate the type of intervention that is permitted and to ensure human health and safety
- Current trend is to add as little as possible (SO₂, acid, oak, herbicides + pesticides) and to be transparent, so consumers know how the wine is made
- It can be argued that some intervention/additions are necessary, such as SO₂ (which also occurs naturally during fermentation)



Sulphur Dioxide (SO₂) in Winemaking

- White wines generally need more SO₂ added during winemaking as opposed to red wines, which have more polyphenolic compounds, a natural defense against oxidation
- Sweet wines (especially wines from botrytized grapes) need higher levels of SO₂ to protect against oxidation (regulations normally permit higher residual levels for sweet/dessert wines as opposed to table wines)



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Oxygen in Winemaking

- Oxygen, either the absence or presence, is critical in the winemaking process
- Reduction: relative absence of oxygen
- Oxidation: relative presence of oxygen
- Most winemaking avoids excessive exposure to oxygen, which causes oxidation or spoilage
- Though some oxygen exposure is beneficial + adds complexity to wine
- Reduction, or total lack of oxygen, can result in the development of reduced sulphur compounds or sulphur flavours (burnt match, onion, rotten egg smells)



White Wine Production

1. De-stemming/crushing of grapes.
 - Stems removed to eliminate bitterness/tannins
 - SO₂ added, grapes are crushed for transfer to press
2. Pressing of must (skins + pulp = must)
 - After pressing, separation of juice from the skins, pulp + seeds
 - Juice is pumped into settling tanks, stems + pits composted, returned to vineyard as fertilizer



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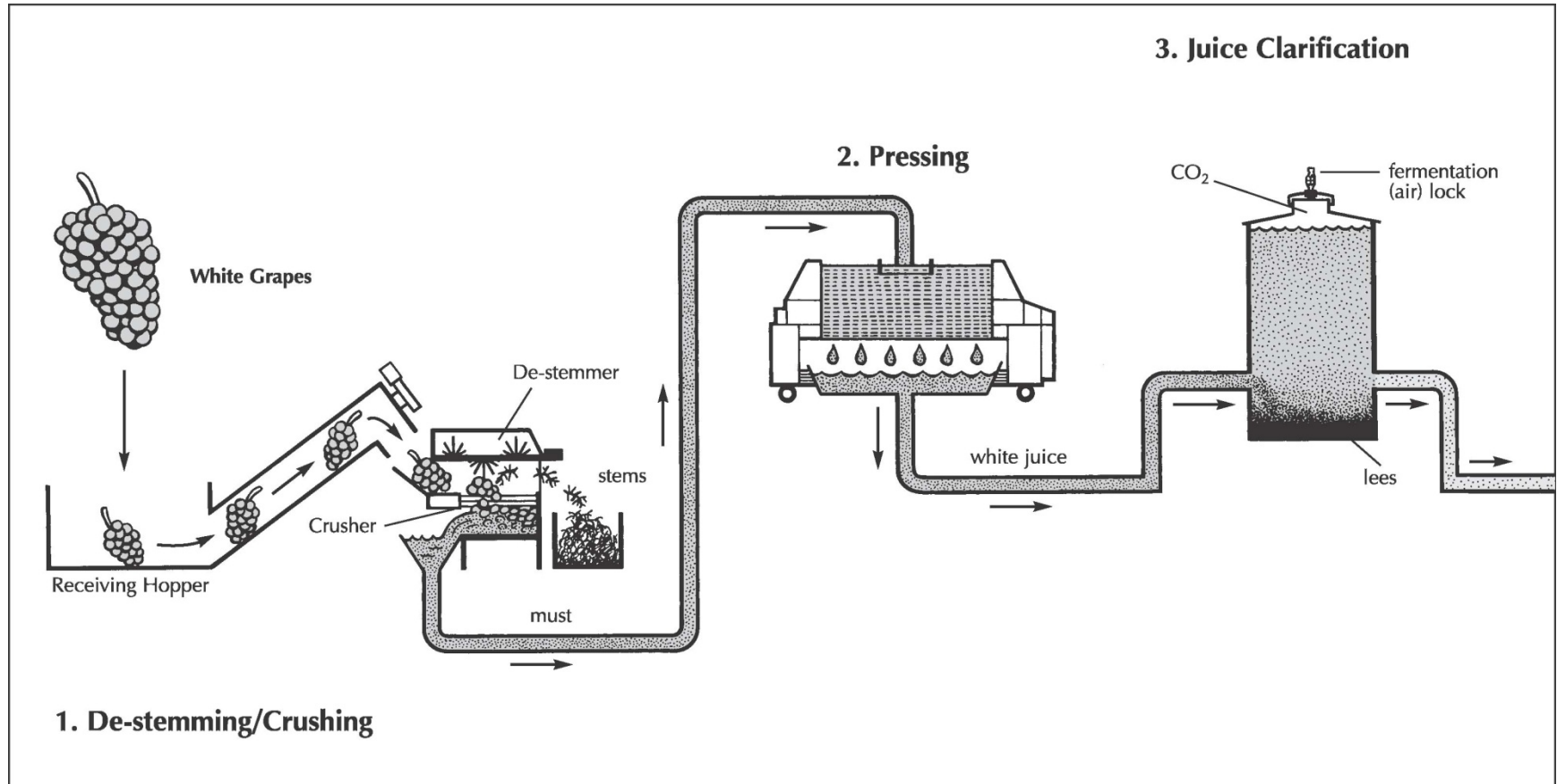


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3. Clarification

- The unfermented juice rests in settling tanks for 48 hours to several weeks, to allow heavy particles to separate and settle
- The juice is then racked off (separated from) the sediment and pumped into stainless steel, oak or concrete tanks for fermentation



WHITE WINEMAKING PROCESS: Courtesy of the Wine Council of Ontario, *The Wine Appellations of Ontario* course book, 3rd Edition

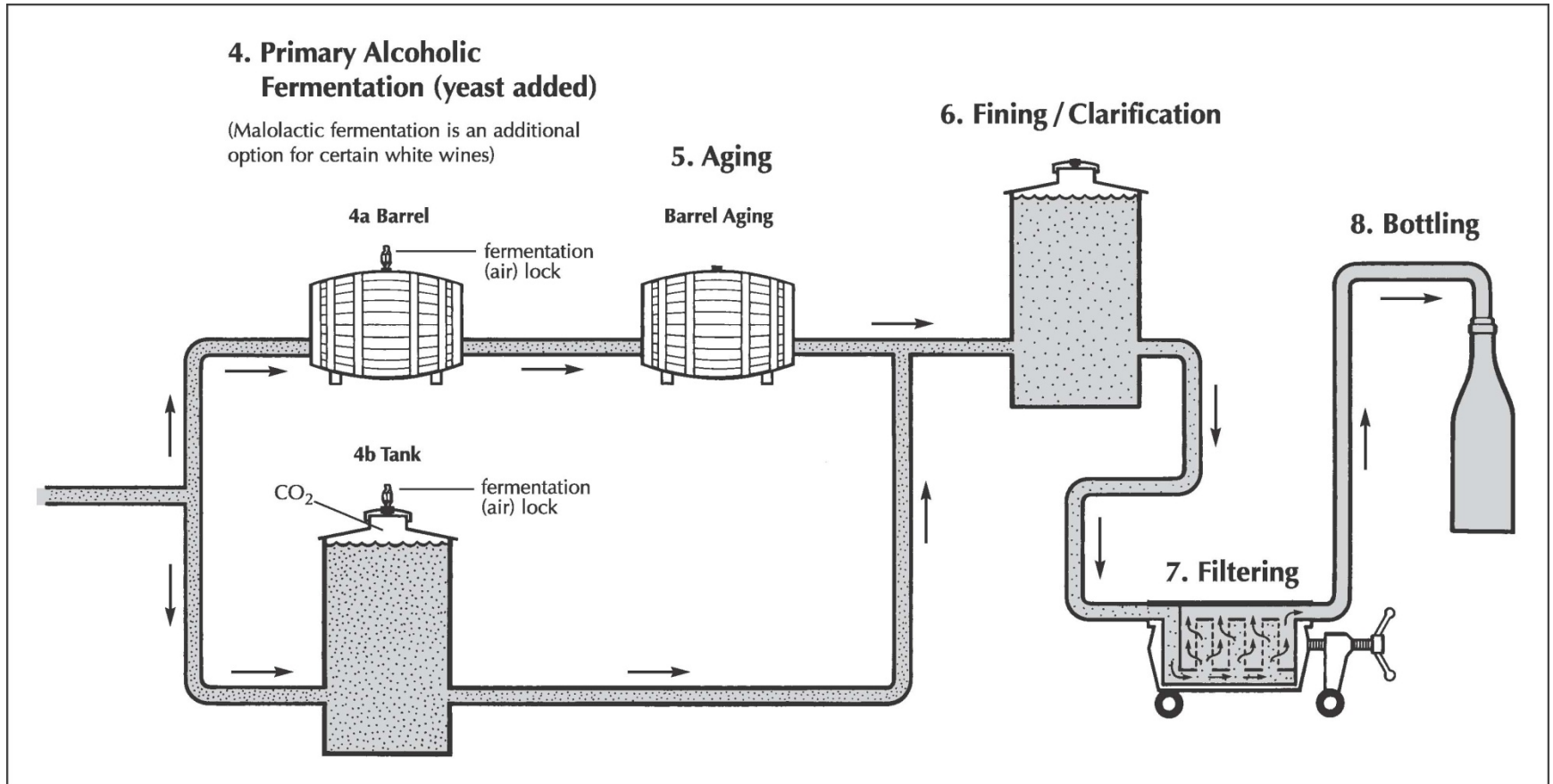


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4. Primary Alcoholic Fermentation

- Can occur naturally (wild yeasts) or through inoculation (cultured yeasts)
- Lasts for 7 to 30 days
- Heat is a by-product of fermentation, though white wine tanks are kept cool (12-18C) to retain fresh, fruit characteristics
- Secondary fermentation (malolactic : conversion of malic to lactic acid) may take place to soften acidity and smooth the palate



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5. Aging

- When fermentation is complete, the wine is aged in stainless steel, oak or concrete, depending on the desired result
- Oak barrels impart flavours and texture to wine, stainless steel and concrete are inert
- Aging from 3 months to 2 years

6. Fining

- Removal of solids and remaining yeast cells (so re-fermentation does not occur) through use of natural substances (egg whites, isinglass, bentonite)



7. Filtering

- Wines are filtered prior to bottling through cellulose fiber pads to remove remaining fine particles

8. Bottling

- Wine is bottled in sterile bottles, bags or tetra-paks
- Sealed with screw cap, cork or synthetic closure and labeled
- Some wines may receive further aging in bottle before release



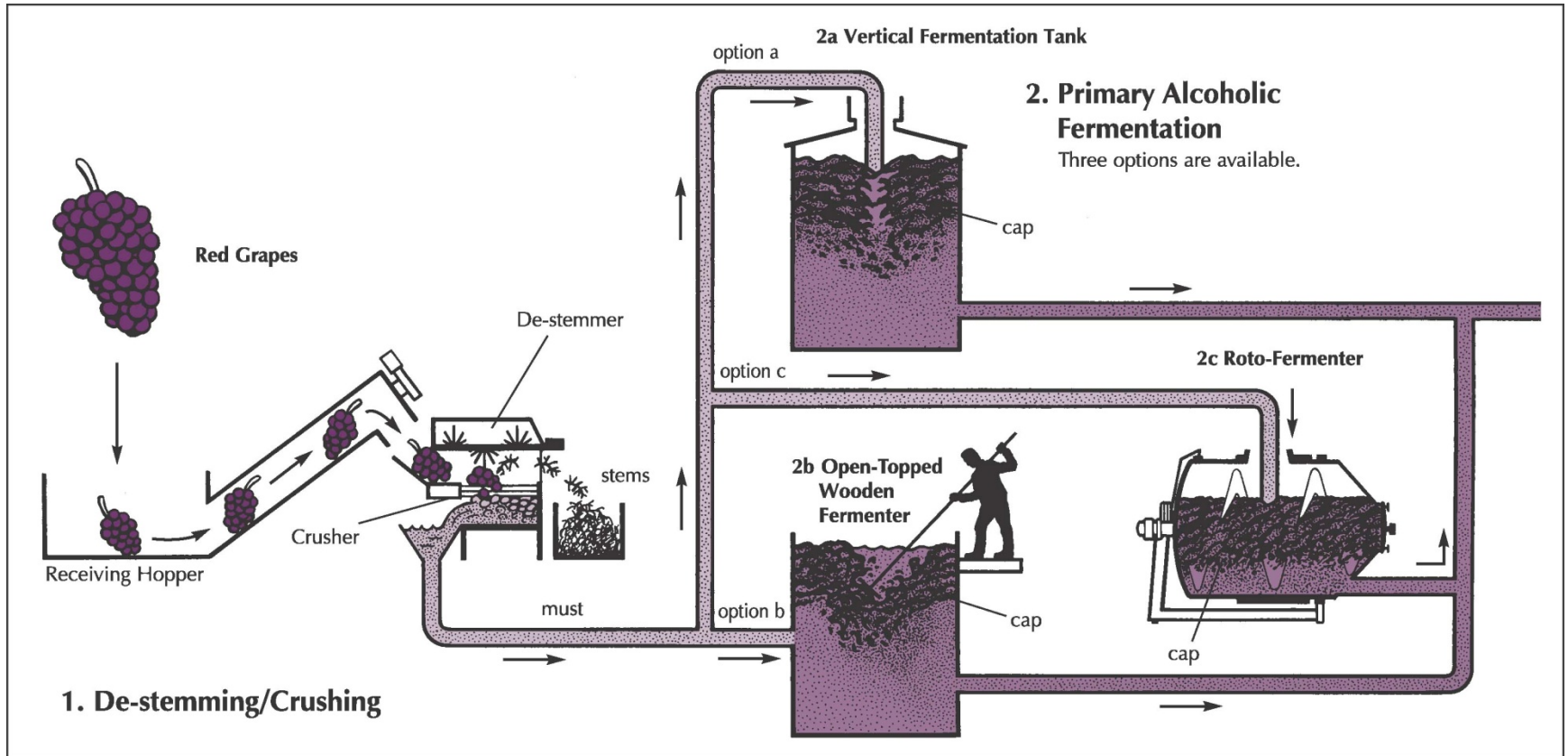
Red Wine Production

- Process is similar to white wine, **except fermentation takes places before the grapes are pressed**
 - Red wine obtains its colour from the skins of the grape + must remain in contact during fermentation
1. De-stemming/crushing of grapes
 - The must (skins + pulp = must) is transferred to fermentation tanks
 - Stems are composted + returned to vineyard as fertilizer



2. Primary Alcoholic Fermentation

- Can occur naturally (wild yeasts) or through inoculation (with cultured yeasts)
- Lasts for 7 to 14 days or longer
- Fermentation of juice and grape skins to allow for maximum extraction of colour, flavour + tannins
- Fermentation temperature is warmer than for white wine, 25 to 35C



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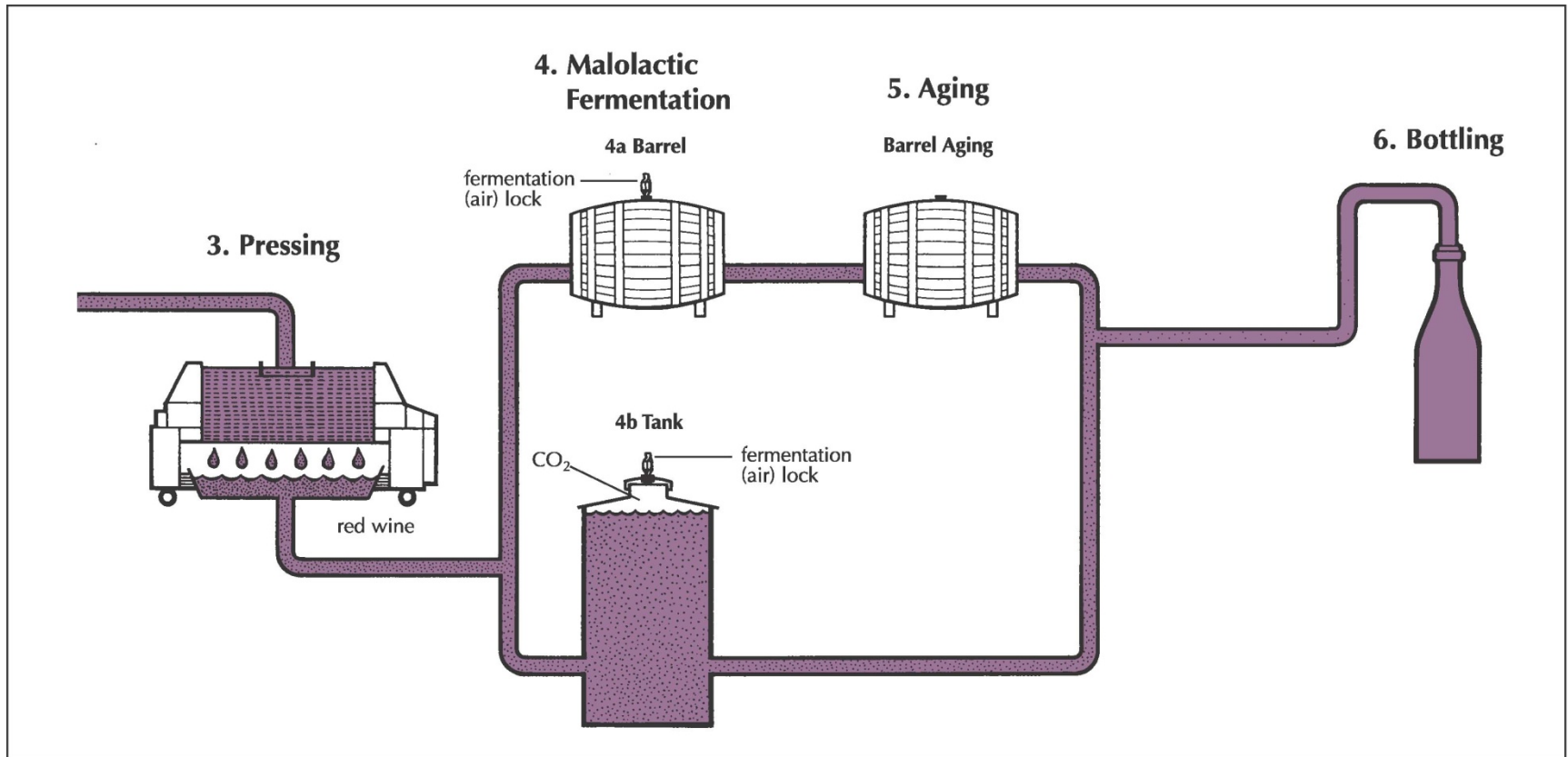


3. Pressing

- Once desired colour + flavours achieved + fermentation is complete, the wine, skins, seeds and pulp transferred to the press
- The skins, seeds + pulp are separated from the juice, which is then pumped into tanks or barrels for aging

4. Secondary (Malo Lactic) Fermentation

- Red wines usually undergo malolactic fermentation (conversion of malic to lactic acid through inoculation) at this stage to soften the acidity, provide mouth feel



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5. Aging

- Red wine can be aged in stainless steel tanks or oak barrels, depending on the results desired
- After many months or years, the wines would be blended (different barrels, different vineyard blocks, different grape varieties)

6. Bottling

- The wines may be fined or filtered, then are bottled
- Some red wines would receive further aging in bottle prior to release and sale



The Art of Winemaking

- Winemakers make decisions at every step of the process to alter + affect the flavour + quality of the wine
- The vintage (growing season) also alters a wine

Some choices + challenges for winemakers:

- When to harvest?
- What yeast to use?
- How long to ferment, at what temperature
- Should the wines be racked off the lees?
- Should the wine be oak-aged?
- Should the wine be blended?



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- Winemaking is constantly evolving as wine growers and wine makers learn more about their vineyards, climatic conditions and the techniques that effect the winemaking process
- In the end, the fruit of their labour is what we see and taste in the glass

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