

“Wine to me is passion. It’s family and friends. It’s warmth of heart and generosity of spirit. Wine is art. It’s culture. It’s the essence of civilization and the art of living.”

Robert Mondavi

As you prepare to make wine, this Private Vineyard Estate winemaking handbook will give you an overview of the winemaking process, steps and decisions that go into making wine.

This process is dynamic; there is no set “recipe.” You will work closely with The Vines winemaking team to ensure that each decision aligns with your overall winemaking goals. Don’t worry – you don’t need an enology degree. The winemaking team will make all of the technical decisions throughout the winemaking process for each of the steps outlined in this guide.

“Mother Nature” plays a key role in winemaking. We will work to achieve the greatest grape quality possible in the vineyard, updating you throughout the growing season on the status of your vineyard and the quality of the grapes.

OVERVIEW

Overall wine quality starts in the vineyard with proper vineyard management and is always subject to the whims of nature. The way you farm your vineyard will affect the winemaking level and style you obtain in the winery. For example, Super and Ultra Premium grapes are generally managed to decrease yield per vine, maximizing concentration and sugar development in the grapes. This may require additional investment due to the additional time and resources involved. While it is unusual for vines of less than five years to produce an Ultra Premium wine, in rare cases, we will classify young grapes as Ultra Premium if they meet the appropriate standards.

While there are factors that vary from year to year due to seasonal climatic influences, The Vines winemaking and vineyard teams will work to optimize quality in your vineyard. The same is true once your grapes enter the winery. Below is a description of the general winemaking process in the winery and the key factors of the winemaking process.

RED WINE PRODUCTION

The main distinction between red wine production and white wine production is that when making red wine, the skins of the grapes are allowed to remain in contact with the juice. Pigments contained in the skins are the compounds that impart color into the wine. Grape juice, even for red or black grapes, is essentially colorless for most red grape varieties. During the period of skin contact, juice and wine leach the pigments from the skin and generate red wine color and other components (structural tannins). The combined effect of alcohol, color and tannins allows the best red wines to age for many years.

VARIETIES

Red wine grapes are an exceptionally diverse bunch. Each variety has its own identity and characteristics. The most popular varieties among Private Vineyard Estates are the following:

Cabernet Franc

Both Cabernet varieties are among the five major grapes of Bordeaux, France. As compared to Cabernet Sauvignon, Cabernet Franc vines can ripen a bit earlier. This, combined with high altitude growing conditions in Argentina, allows this varietal to achieve optimal ripeness and additional complexity and color extraction. As with Merlot, Cabernet Franc is typically used as a blending element in most parts of the world instead of single variety bottling. Vineyard practices can have a dramatic affect on the finished wine. Excessive crop and poor fruit exposure tends to emphasize the vegetative aroma and flavor elements. Other characteristics include: blackcurrants, laurel leaves, green peppers, ash and spice.

Cabernet Sauvignon

Worldwide, Cabernet Sauvignon is one of the most dominant and well-known red grape varieties. The varietal evolved from crossing the red grape Cabernet Franc and the white grape Sauvignon Blanc. Cabernet Sauvignons were first used in winemaking in Bordeaux. Wines made from this variety have strong tannins, high acidity and powerful dark red fruit flavors. The style of wine produced from Cabernet Sauvignon grapes varies considerably from one geographic region to another. Major variables include the climate, soil and winemaker's touch. Because of their potentially high level of tannins, Cabernet wines may require years of cellaring prior to consumption.

Malbec

This variety, used in some Bordeaux blends, originates from the Cahors region of France, but it is primarily found grown throughout Argentina. As with Merlot and Cabernet Franc, the Malbec grape is generally used for blending in other parts of the world. French Malbec is typically a medium- to full-bodied red wine with ripe fruit flavors of dark red fruits and berry. The structural tannins are usually a bit tighter than those of Merlot. Quite the opposite is true in Argentina where Malbec has established a worldwide reputation and recognition. These wines bring very deep color, intense dark fruit flavors and ample, silky tannins. Compared to their French counterpart, Argentine Malbec has shown greater potential for bottle aging.

Merlot

The Merlot grape, a classic French variety, originated from the Bordeaux region. It produces a soft, medium-bodied red wine with juicy fruit flavors. Merlot is often used to blend with other varietals, such as Cabernet Sauvignon and Cabernet Franc. Merlot wine can be used as a blending component to soften and mellow the Cabernets. In turn, by blending with a small amount of the Cabernets, the structure of Merlot can be improved. This highly versatile wine has a range of fruitful aromas such as plums, black currant and dark berries. Along with the fruit characteristics, there are tendencies for chocolate, herbaceous and peppery aromas and flavors.

Petit Verdot

This is another traditional classic black grape varieties approved for blending in Bordeaux. Petit Verdot is more commonly used for an element of spice by blending small amounts to improve a wine's dense fruit aroma, dark color, powerful flavors, acidity and tannins. Although the historical origin of this grape has yet to be determined, it is likely that the Petit Verdot variety was planted in Bordeaux earlier than Cabernet Sauvignon. Late ripening limits its usefulness in the coolest grape growing areas. Petit Verdot is occasionally, but rarely, bottled as a single vine variety.

Pinot Noir

This varietal is thought to have originated about two thousand years ago and is the dominant red grape variety of the world-famous Burgundy region of eastern France. Pinot Noir is a finicky grape. It only grows in a particular climate, with the right soils and the right care. The grape can make marvelously aromatic, flavorful wines boasting a seductive perfume of strawberry, raspberry, black cherry, tea, mint, violets and oriental spices with silky, delicate flavors.

Syrah

Syrah is thought to have originated in the northern part of the Rhône Valley of eastern France. In France, it is known and grown as Syrah and is responsible for some of the Northern Rhone's big, bold red wines. However, in Australia and South Africa it is known as "Shiraz." Syrah wines display firm tannins, a medium to full body and the rich round flavors of black cherry, blackberry, plum, bell pepper, black pepper, clove, licorice, dark chocolate and smoked meat.

Tempranillo

The most famous grape used in the Spanish Riojas, Tempranillo is well-known for expressing ripe red fruit, cherries, strawberries, tannins and tobacco in its wines. Tempranillo clones develop highly colored, structured wines. It also allows for long-term aging in oak barrels.

Mourvèdre

Mourvèdre is a red wine varietal that is grown in many regions worldwide although mostly known in Rhône and Provence regions of France. In addition to making red wines, Mourvèdre is a prominent component in "GSM" blends where it is blended with Grenache and Syrah. Mourvèdre tends to produce tannic wines that can be high in alcohol, but that depends a lot the region where it is grown.

Grenache or Garnacha

Grenache is one of the most widely planted red wine grape varieties in the world. It ripens late, so it needs hot, dry conditions. It is generally spicy, berry-flavored and soft on the palate with relatively high alcohol content, but needs careful control of yields for best results. It tends to lack acid, tannin and color, and is usually blended with other varieties such as Syrah, Grenache and Tempranillo. Grenache is the dominant variety in most Southern Rhône wines, especially in Châteauneuf-du-Pape where it is typically over 80% of the blend.

WHITE WINE PRODUCTION

The main difference between red wine production and white wine production is that when making red wine, the skins of the grapes are allowed to remain in contact with the juice for an extended period of time.

In white wine production, the skins, seeds and stems are separated from the juice before alcoholic fermentation begins. White wines are typically fermented at cooler temperatures for extended periods of time, and they are aged over shorter periods of time.

VARIETIES

Each white varietal has its own identity and characteristics. The varieties currently grown in the Private Vineyard Estates are:

Chardonnay

The king of whites, Chardonnay is a consistently excellent, rich and complex white wine. Of unknown origin, this amazingly versatile grape has adapted very well around the world, producing good results from the cold weather of the Champagne region to the hottest temperatures of Australia. When well made, Chardonnay offers bold, ripe, rich and intense fruit flavors of apple, fig, melon, pear, peach, lemon, pineapple, and grapefruit, along with spice, honey, butter, butterscotch and hazelnut flavors. Winemakers build more complexity into this easy-to-manipulate wine using common vinification techniques: barrel fermentation, sur lie aging (during which the wine is left on its natural sediment) and malolactic fermentation.

Sauvignon Blanc

The main white grape from Bordeaux and Loire Valley, France, Sauvignon Blanc has adapted very well to different viticultural regions in the world, such as New Zealand, the Northeast of Italy, Chile and the coastal valleys of California, Australia, and Argentina. Sauvignon Blanc tends to be a medium-bodied white with tropical fruit flavors and often has notable grassy or musky aromas. Very crisp and refreshing, and matching well with foods, this wine drinks best in its youth, but sometimes will benefit from short-term cellaring.

Torrontés Riojano

Just as Malbec is considered Argentina's unique, great red wine, Torrontés is considered its best white. Of unclear origin, it is thought to come from the Mediterranean. Related to the muscatels, it is currently mainly grown in Argentina. Torrontés has a very particular aromatic essence of peach and flowers, such as rose or jasmine. It is crisp, with tons of character and notes of tropical fruits, such as pineapple and guava. Excellent examples of this wine come from the Salta and La Rioja regions of Argentina. More recently, San Juan, Mendoza and Neuquén regions of Argentina are also beginning to produce Torrontés with remarkable results.

WINEMAKING

Winemakers consider vineyard growth, seasonal variations and grape quality to determine the winemaking procedures in the winery, which will then influence the decisions made for overall wine style and production. You will work closely with the winemaking team to determine the best methods to achieve your overall winemaking goals.

Based on your decisions about wine level, style and production quantity, the winemaking team will create a plan to achieve your winemaking goals. All of the values below reflect a basic baseline, but each element will depend on climatic and seasonal variations. The winemaking team will make all the necessary technical decisions to best meet these ranges and your winemaking style.

In addition, The Vines winemaking team will guide you through the fermentation process and the oak regimens recommended to meet your style and level decisions.

BASE WINE ALCOHOL

Target sugar when picking – 23 to 28 Brix

Target range of alcohol – 13 to 16%

The level of alcohol found in red table wine typically ranges between 13% -16%. Ultimately, the final level will be dependent upon several factors: wine region, grape variety, target consumer and winemaker or stylistic preference. The basic rule of thumb: lower sugar equals lower alcohol; and higher sugar equals higher alcohol. Cool grape growing regions tend to generate wines of lower alcohols, and warmer climates align with higher alcohols.

One of the benefits of a cooler climate is “hang time” – when grapes are allowed to remain on the vine for an extended period before harvesting. This encourages the development of increased varietal or desired grape flavors. During the fermentation processes, higher potential alcohol levels can have an effect on the yeast health and viability. Grapes, and subsequently wines, starting at sugar levels >25 brix have a tendency to “stick” or the yeast will stop fermenting with residual sugar. Wines with excess residual sugar are microbiologically unstable and susceptible to a host of potential spoilages. Prudent winemaking practices should take into consideration the sulfur dioxide, aging conditions, storage temperature and filtration prior to bottling. In any case, these processes add components that are not grape or native to the vineyard. At times an addition of refined grape acid (e.g., tartaric and/or malic acids) is required. The alcohol level has a profound effect on the sensory qualities of wine. Those effects vary as alcohol concentration increase (10-16%): from lean, thin, and acidic; full, thicker, and more viscous; and burning to searing flavors and aromas. The “sweet spot” or ideal alcohol level for a given wine comes with winemaking experiences, and with the grapes and their source.

Private Vineyard:

Alcohol is, in large part, based on the amount of sugar in the grapes. Due to the climatic conditions of the Uco Valley and the high degree of thermal amplitude (temperature difference between day and night), the vineyard is able to achieve a long “hang time” which allows the grape to concentrate flavors evenly over a long period of time with robust sugar levels.

Both climatic conditions throughout the year and harvest conditions will affect targets and ranges, so our winemaker and vineyard team will determine the optimal time to harvest your grapes. Prior to harvest, grape samples will be taken periodically to monitor sugar levels, or brix, in the grapes, which will then be a determining factor in the eventual alcohol level of your wine. Generally, you will find alcohol levels of 14% for Merlot, 14.5% for Syrah and Cabernet Sauvignon and 14-15% for Malbec, Petit Verdot and Cabernet Franc, but these alcohol levels will depend on the harvest and growing conditions.

TOTAL ACID (TA)

Target range: 0.4 to 0.65 g/100mL

Total or Titratable Acidity (TA) is a measure of the amount of acid in solutions. Acidity generates the sourness, crispness or zesty flavors perceived in wines. The principal acids found in grapes, and therefore wine, are tartaric acid and malic acid, which the grape produces as it develops. In warm climates, these acids are lost through the process of grape respiration. Grapes grown in warmer climates have lower acidity than grapes grown in cooler climates (just opposite of sugar production). Warmer climates result in high sugar and low acid whereas cooler climates result in low sugar and high acid. The acidity level can be influenced by winemaking decisions such as when to pick the grapes and fermentation process. For some producers, harvest decisions are based on TA levels rather than sugar. It is easier to add acid than to remove it.

The range of TA found in red wines varies depending on variety, region, vintage and style. The acidity in wine provides a feeling of crispness or freshness. Too much acidity creates a sour sensation and too little leaves a bland or dull impression. Cooler climate wines tend to be crisper and more tart, while wines from warmer climates can be bland and soapy. Additionally, wine acidity can heighten the flavors of foods and it can even cut the fattiness of some foods. As a rule of thumb, food acidity should be less than the wine acidity, and/or full-bodied wine with full-bodied foods.

Private Vineyard:

Total Acidity is monitored throughout the winemaking process to hit the target range above. Grapes from the Uco Valley generally have good acid maturation in the vineyard. The acid levels will be monitored during primary fermentation, and if levels are low due to climatic conditions, an acid addition will be considered. Generally, you can expect results of 5.2g/100ml for Syrah, Petit Verdot and Cabernet Sauvignon; 5.6 g/100ml for Malbec; and 5.8g/100ml for Merlot. However, this will depend heavily on the growing season and state of the grapes being fermented, reflecting seasonal variations.

pH

Target pH – 3.40 to 3.80

The pH is the measure of a solution's acidic or basic state. It is a scale that ranges from 1-14. Pure water is neutral or 7 on the pH scale. Solutions with a pH less than 7 are acidic, and solutions with a pH greater than 7 are basic or alkaline. In general, the pH range of wine is between 3-4. The pH range for most still red wines varies from 3.4 to 3.8. The total acidity has a direct effect on pH, and they are often looked at together when evaluating the chemical composition of a wine sample. A lower pH at the same titratable acidity (TA) gives more sourness. Astringency (bitterness) is also affected by pH; it decreases as pH increases. Higher pHs tend to give a rounder, softer mouthfeel; however, it may have a more unstable color. Lower pHs reduce the amount of preservatives required, such as sulfur dioxide, to maintain microbial stability. Other characteristics of pH that should be considered include microbial stability and lower oxidative potential. pHs higher than 4 are generally avoided, as spoilage is more likely to occur above this level. Many winemakers keep red wine pH below 3.65. In most cases, they tend to ignore TA and acidify/de-acidify to achieve the optimal pH.

Private Vineyard:

Depending on climatic conditions, grape quality and your wine style, an optimal pH will be determined and managed accordingly throughout the winemaking process. An average base range for varietals is: 3.5 for Merlot; 3.75 for Syrah, Petit Verdot, Cabernet Sauvignon and Cabernet Franc; and 3.8 for Malbec. These values will vary to reflect the seasonal conditions of the grapes per varietal each year.

COLD "SOAK" OR MACERATION

Cold "Soak" or pre-fermentation "maceration" is a prescribed period skin contact, at a specified temperature (typically at 8-10°C) before commencing the fermentation processes. The time period for this soaking varies and is dependent upon variety, vintage, time, temperature, the winemaker and stylistic goals. Typically, the soak ranges from 24 hours to 5 days. These temperatures, coupled with the addition of SO₂, suppress native or spontaneous fermentations, allowing for the non-alcoholic extraction of color and compounds associated with wine stability. Variety, seasonal elements, duration and temperature are variables that need to be considered before cold soaking. Tannins extracted during the cold soak period come from the skins and stems, not from intact or whole seeds. Another reason for cold soaking is that it allows for the grape must to homogenize. This gives the winemaker greater insight into the analytical makeup of the must, and adjustments can be made accordingly.

Private Vineyard:

For all wine styles, a cold maceration period will be performed, depending on the climatic and grape qualities, to extract the best characteristics of the grapes.

DE-STEMMING AND CRUSHING

Shortly after arriving at the winery, red wine processing begins with de-stemming and crushing the red grapes. The resulting liquid is called 'must' and consists of skins, seeds and juice. Typically, the stems are removed as they contain abrasive and unpleasant flavors. For red grapes, the process of de-stemming and crushing is usually more forceful than in white wine production. Since the indispensable red wine color is contained in the grape skin, most winemakers require

the grape skins to be broken in order to expose the pigments. No matter the degree of crushing, the process should only split the skins of the grapes. Crushing or shearing of the grape seeds should be avoided. This is especially true if the grape seeds are green or immature. Crushing will expose green or bitter characters into the wine.

Depending upon the level of stem lignifications or tannin maturity, winemakers will sometimes leave a percentage of grape clusters intact or add some stems to the must to impart more structural traits into the wine. Similarly, the winemaker may simply de-stem the grapes and avoid breaking skins altogether. This is called whole berry fermentation. Although whole berry fermentation is usually used in white wine production, it may be used for light bodied red wines or for microvinification with ultra premium wines in new oak barrels. Depending on the grapes and wine style, winemakers often will use a portion of whole berry and crushed fruit during fermentation to accomplish variations of the wines' characteristics and structure. Another twist comes from "whole cluster fermentation" or intact clusters, as picked from the vine, with no intervention of machines (all berries intact and in contact with the stems). Whole cluster fermentations preserve the aromas of fresh berries and the spice of vanilla, clove and cinnamon. A mature stem contributes spice aromas and flavors; the tannin from this stem provides weight, body and length to the wine. With physiologically ripe fruit and mature stems, the benefits of fermentation temperature control and enhanced fruit aromas can be achieved.

Private Vineyard:

We make several options available including machine de-stemming, hand berry selection and hand de-stemming. The winemaking team will recommend the proper method, or combination of methods, based on your wine style as well as the quality and ripeness of the grapes and stems.

FERMENTATION CONTAINERS OR VESSELS

After the grapes have been de-stemmed and crushed, the must is pumped or moved to fermentation containers. Here the must will undergo maceration (contact between the grape skins, seeds, juice and wine) and alcoholic, or primary, fermentation.

There are many different types of fermentation containers: large and small stainless steel tanks, oak vats, concrete tanks, oak barrels and plastic macro bins. The most commonly used fermentation vessels are stainless steel (SS) tanks. These vessels are readily available in various styles. SS tanks can be equipped with jackets for heating and cooling, thermostats and insulation for regulating fermentation and storage temperatures. Since red wine fermentations can exceed 30-35°C, controlling the temperature and the rate of fermentation is essential to managing wine style and quality. Excessive temperatures coupled with alcohol can produce overly extracted wines. Temperature moderation also facilitates good yeast health and a steady rate of fermentation. SS tanks are easily cleaned, sanitized and sterilized. Most importantly, these vessels are neutral and do not impart any characteristics into the stored juice or wine.

Plastic macro bins are typically used for small lot production. Their versatility allows the winemaker to experiment on a small scale, making small and specialized wine lots. The bins are mobile and stackable, allowing for their movement between cool and warm environments. Oak fermentation vessels are less desirable because of their expense and difficulty to clean and keep microbiologically sound.

Private Vineyard:

For small lot fermentations performed in our winery, we mostly use one-ton stainless steel tanks. Oak barrels will also be available.

OPEN VERSUS CLOSED FERMENTATION VESSEL

The design of the fermentation vessel has a powerful effect on wine style. Below is a brief outline of the differences between open and closed fermentors:

Open fermentors:

- allow for dissipation of heat generated during fermentation
- allow a significant amount of ethanol to escape
- provide more contact with oxygen
- are only practical for small production lots
- allow for gentle cap management (e.g., manually punching down the cap)
- are less suitable for extended maceration

Closed fermentors:

- are easily sealed
- make warming and cooling of the must easier
- can hold large volumes of grapes
- can be used for storage and fermentation of white wines
- make cap management difficult
- have a tendency to allow the fermentation to get too hot

Private Vineyard:

Our winery is equipped with open fermentors to achieve optimal quality for your wines.

SULFUR DIOXIDE

Sulfur Dioxide (SO₂) is a preservative that is commonly used throughout the processes of winemaking. Its primary role is as an antimicrobial agent, preventing the proliferation of spoilage yeast, mold and bacteria. To a lesser degree, it acts as an antioxidant to prevent browning. Sulfur dioxide additions and adjustments are made throughout the winemaking process.

For most red wines, SO₂ is typically added as the grapes are being de-stemmed and crushed or as the must is moved to the fermentation vessel. Depending on the quality of the vintage (maturation level and incidence of rot affected fruit), SO₂ is added in a range from 30-50 mg/L. In general, early SO₂ management is necessary when producing fruitful red wines. Consideration of the juice pH and TA will determine the quantity of the SO₂ addition. When there is an excess of SO₂, it can also produce a pungent aroma in red wines, considered by most to be a fault. The aroma is best described as that of a match that has just been struck. In red wine production, SO₂ can be added to the grape as it is harvested, at

juice extraction, during or at the completion of wine movements, at the completion of the malo-lactic fermentation, throughout aging in tank or barrel, and prior to bottling.

Private Vineyard:

Your wines will be carefully monitored throughout the winemaking process to maintain the optimal level of SO₂.

ADDITIONS

During and after the cold soak period, winemakers can make adjustments and add acid, yeast nutrients, enzymes and enological tannins to the pre-fermentation grape must. Additionally, during the aging process, oak barrels can infuse tannin into the wine.

Tannins are a family of natural organic compounds found in grape skins, seeds and stems. They are an excellent antioxidant and natural preservative, adding structure and texture to the wine. Tannins also provide an important flavor dimension. If the tannins of the grape must are determined by experience or analysis to be insufficient, there is a vast array of commercial enological tannins available to enhance the final product. Many of these materials are tailored to perform specific functions. Tannins are added to:

- mask characters of raisined or sun-damaged fruit
- resolve or refine unripe grape tannins
- increase structural or textural tannins
- help stabilize and fix color compounds
- improve or modify aromas.
- increase aging potential

In addition to the tannins, there are specific groups of enzymes that can be used during maceration to increase the extraction of compounds contained in the cells of the grape skin. These can be used to increase color, color stability and structural tannins.

Private Vineyard :

Additions will be handled on a case-by-case basis depending on climatic and grape conditions. Often added are commercial yeast cultures, DAP (diamonium phosphate) yeast nutrients that ensure proper proliferation of the yeast culture as well as tartaric acid to ensure proper pH and acid levels in the fermenting wine.

YEAST

Yeast are single cell micro-organisms that utilize the sugars of the grape juice as an energy source. As a result, the yeast produces alcohol, carbon dioxide (CO₂) and heat as by-products of a metabolic process known as alcohol fermentation. Yeast cells are naturally present on the grape skins. Once the grape skin is broken, exposing the grape juice, the yeast can ferment the grape sugar naturally.

The winemaker may choose to allow the fermentation to commence in a number of ways, including indigenous yeast flora (“native” or “natural”), cultured yeast strains or a combination of the two. Stylistic distinction is the force that drives winemakers to encourage native fermentations. Because the native flora is a mixture of yeast populations, they will generate unique flavors (fuller and rounder palate structure) and heighten varietal and fruit aromas. Without experience, the lack of predictability is the most troublesome effect when considering native fermentations. Through many years of research, strains of yeast have been isolated and cultured so as to produce reliable, controllable and consistent fermentations for specific wine styles. Cultured yeast is the preferred means for primary fermentation. The species of yeast primarily used in wine production is *Saccharomyces cerevisiae*. Various strains of yeast can influence the aroma and flavor of wine. The selected yeast should ferment with low volatile acidity (VA) and sulfur dioxide formation, at temperatures between 25-35°C, and with low incidence of stuck or incomplete fermentation.

Private Vineyard:

You will have the option to choose either native yeast fermentations or to add different international commercial yeast strains. In general, native yeast fermentations are more difficult to manage, increasing risk to the process. Depending on climatic conditions annually, it may be necessary to add yeast to native fermentations to ensure proper fermentation. In the first few years, we recommend starting the fermentation with a commercial yeast culture. The winemaking team will recommend a specific type of yeast, depending on the style of wine you have decided upon, to obtain optimal wine characteristics.

FERMENTATION AND CAP MANAGEMENT

As the fermentation begins, the skins and seeds rise to the top and form a cap. A portion of the heat released leads to a higher temperature in the cap as compared to the fermenting liquid below. In order to release the trapped heat and promote extraction of skin constituents, the cap is periodically broken and the must is stirred. Depending on a number of stylistic factors, the must is fermented between 25-35°C. Whereas white wines may be fermented for a month or more, it is rare for it to take longer than two weeks for red wines.

In addition to the alcohol created by fermentation, pigments and tannins are imparted into the must from skin contact. This is called maceration, and it often lasts longer than fermentation. As the fermentation progresses, a cap will form as released carbon dioxide pushes skins and other solid materials to the top of the fermentation vessel. Because the skins need to be in contact with the liquid, breaking up or pushing this cap back into the fermenting juice or wine is necessary. This process is known as cap management. Not only does it increase the contact and extraction, but it also facilitates fermentation temperature regulation and yeast health, and it incorporates small amounts of oxygen into the wine.

The primary goals of cap management are to keep the cap moist and cool enough for the yeast to remain active, to redistribute sugar so that the viable yeast can get to it, to keep solids in the cap in anaerobic conditions to prevent production of volatile acidity by Acetic Acid Bacteria, and to extract compounds from the skins.

The four most common modes of cap management are punch-down, pump-over, submerge cap and delestage (also referred to as rack-return).

The term “punch-down” is descriptive of the actual process. The cap is broken up by physically punching or pushing it down into the fermenting juice. Fermentors larger than five tons in capacity tend to generate fermentation caps that are too thick for manual manipulation. Thus, punching-down this type of vessel should have a semi or automatic system to assist with the breaking of the cap. An advantage of punching-down is that it does not require any pumping (mechanical movement) and is therefore gentle on the wine. Under normal conditions, punching-down is also fairly oxidative. This method is ideal for the management of smaller sized wine lots. Punching-down usually occurs 2-3 times per day for approximately 5 minutes each time. The frequency of punch-downs is greater at the beginning of fermentation and decreases or ceases as the must convert sugars to alcohol and achieves dryness.

Pumping-over uses a mechanical pump and a series of hoses to draw wine or juice from the bottom of the tank (specifically the racking valve) and pump the liquid to the top of the tank. The cap is moistened or irrigated using various techniques, including fire-hose or various cap irrigators. The use of cap irrigators of various designs, instead of a “person-with-a-hose,” has become a common part of many pump-over regimes. On the practical side, using a cap irrigator makes setting up and performing a pump-over easier. This means that a worker does not have to be at the top of the tank for the duration of the process. Cap irrigation tends to extract finer and resolved tannins. It is also one of the more oxidative cap management techniques. This tends to be good for varieties like Cabernet Sauvignon and Syrah, because their quality tends to improve with the inclusion of air. Early in the fermentation process, this operation is performed daily and may involve partial or complete juice volumes to be pumped over. At the height of fermentation, the frequency of pump-over increases to 2-3 times per day. As the rate of fermentation decreases, the pump-over rate decreases to occur once daily or is eliminated.

In submerged cap systems, a grate is placed in the fermentor to keep the skins submerged throughout the fermentation. Any heat generated in the submerged cap is readily dissipated into the surrounding must. Because the cap is held under the surface of the fermentation, the amount of pumping required should be significantly less than for a conventional pump-over. A pump-over is typically incorporated to release unwanted volatile aromas like hydrogen sulfide (H₂S) or “rotten egg.”

Delestage is a two-step “rack-and-return” process in which fermenting red wine juice is separated from the grape solids by racking and then returned to the fermenting vat to re-soak the solids. This step is repeated daily. Racking the fermenting juice oxygenates, or aerates, the wine and softens the astringent tannins through oxidation. It also stabilizes the wine’s color. Racking during maceration and fermentation is the underlying difference from traditional maceration-fermentation, in which the juice ferments under a layer of carbon dioxide (CO₂) gas and is seldom aerated until racked at the end of fermentation.

The difference between a pump-over and delestage is that the wine is never separated entirely from the grape solids. During delestage racking, the cap slowly falls to the bottom of the vat while the wine is allowed to drain completely under the weight of the grape solids. Once the wine is completely racked, a portion of the grape seeds is removed to avoid imparting the harsh tannins in seeds to the wine. Following racking, the grape solids are allowed to settle separately from the fermenting wine for 1-2 hours or more depending on the size of the fermenting vat. The fermenting wine is returned to the vat over the cap using a gentle, high-volume pump to completely soak the grape solids for

maximum color and flavor extraction while minimizing extraction of harsh phenols. This process is repeated daily until the end of fermentation. As fermentation progresses, more seeds are released from the grapes, a portion of which can be removed during each racking operation.

Private Vineyard:

Depending on the varietal and the style of wine you have chosen, these procedures will vary. Accordingly, your winemaker will create a program to maximize flavor and color extraction for each wine. For example, if you ferment in a small macro bin, hand punch-downs will be performed; whereas for tanks, you can elect pump-overs, delestage and aeration. The winemaker will make a recommendation during the primary fermentation period as to what methods will be best for the style and quantity of your wine.

FERMENTATION TEMPERATURES

Fermentation releases a significant amount of heat, and the must cap acts as an insulator, further increasing the must temperature. Increased temperature enhances the rate of fermentation and the extraction of color and phenolic, or aromatic, compounds. Beyond a certain level (e.g., above 32-35°C), excessively high temperatures can cause a “stuck” or unfinished fermentation, promote the growth of undesirable microorganisms and contribute to the formation of off-odor compounds. Therefore, controlling temperature during fermentation is critical. Red must is generally fermented in the temperature range of 25-30°C. Red wines fermented at lower temperatures (22-24°C) tend to be lighter in color and structure and have fruity aromas. When fermented at hotter temperatures (30-35°C), the resulting wines can be overly extracted, exhibit poor color and have thin palate. If the temperature exceeds 35°C, yeast viability declines, resulting in a stuck fermentation. These wines often show cooked characters with a thin and sweet palate.

Private Vineyard:

Depending on climatic conditions and grape quality, fermentation temperatures will be maintained to ensure proper and even primary fermentations, preserving essential aromas and delicate wine characteristics while extracting optimal fruit flavors according to the wine style you have elected. Fermentation temperatures will vary based on the varietal of wine. You can generally expect cold maceration temperatures of less than 10°C, followed by primary fermentation temperatures of 20° C which increase approximately 2°C per day during the fermentation period to around 28-30° C ,with a post fermentation temperature of about 27-28°C. Each lot is monitored and graphed according to the trajectory of fermentation.

LEVEL OF EXTRACTION AND EXTENDED MACERATION

Skin constituents have a significant influence on the quality and style of red wine. A good understanding of these components, their extraction pattern and their evolution during maturation and aging is important in making stylistic decisions in red wine production. Color and tannins are the two major components that are extracted from skins during fermentation. The purplish-red color of red grapes is due to the pigments known as anthocyanins. These pigments are located in the grape skins. In grapes, many kinds of anthocyanins are present. They occur in both color and colorless forms. The amount of pigment in colored or colorless form is strongly influenced by the pH of the wine and also by the presence of free sulfur dioxide.

Tannins also play an important role by forming complexes with pigments, which contributes to color stability. These pigment and tannin complexes are less sensitive to changes in pH and SO₂ levels in wine. During alcoholic fermentation, both the pigments and tannins are extracted from the skin, but their pattern of extraction is slightly different. The extraction of color is rapid at the beginning of fermentation. It reaches a peak in the first 2-3 days, and then slightly declines during the remainder of fermentation. This means a short maceration time of about 2-3 days is sufficient to obtain good color. Tannins and other phenolic substances also are extracted quickly at the beginning, but their rate of extraction slows down as the fermentation proceeds. However, the concentration of total phenols (this includes tannins) continues to increase toward the end of fermentation.

The extraction of color and tannins is influenced by temperature, length of skin contact and the cap management technique followed during fermentation. Increasing fermentation temperature from 20 to 30°C causes an increase in color and tannin content of the resulting wine. The length of skin contact also influences extraction. A longer contact time generally means greater extraction of skin and seed constituents into the wine.

The winemaker has several options in determining the length of time of skin contact during red wine fermentation. One approach is to ferment the must until the sugar level drops to between 5 and 0 brix. Depending on the conditions of fermentation, it may take 3-5 days to reach this level. Note that in this range (0-5 brix), the must will contain some residual sugar, and the fermentation will be expected to continue after the must is pressed and skins are removed. This approach should yield wines with good color and fruit flavor with a soft and round mouthfeel. These wines are consumed when relatively young or after a short maturation period. They would not require prolonged aging to achieve a higher quality.

A more common method is when the must is fermented until it reaches dryness, (i.e., all the fermentable sugar is used up) and then pressed. If a winemaker wishes to extract more tannins, the skin contact time is extended for 1-3 weeks. Generally, after the completion of fermentation, the tank is closed, and the must is left undisturbed. Over time, the cap sinks to the bottom and the must is then pressed. This approach is recommended for the production of full-bodied, dark and tannic red wines. They require a long maturation and aging time before they are ready for consumption.

Private Vineyard:

You will work closely with your winemaker throughout the winemaking process and, depending on the wine condition and the wine style you have chosen, you can elect to have your wine undergo a post fermentation maceration to further extract characteristics and achieve more intense flavors and colors. Powerful and Intense styles will most likely undergo this process while Fruit Forward wines will bypass this step.

PRESSING

The decision to press the must is made according to the desired wine style, when an optimum amount of color, flavor, tannins and other constituents are extracted. Generally the juice is drained or pumped, the cap is transferred to the press, and the must is then pressed. Typically, the fractions, free-run or drained wine and the pressed wine, are kept separate. Depending upon the press wine quality and the ultimate style of production, this wine may be re-incorporated with the free-run to provide aromatic nuances and palate structure.

Private Vineyard:

After the wine has completed primary fermentation and your winemaker has established the wine style you have chosen, we will determine the pressing regimen. You will be able to elect to have the pressed wine separated from the free-run wine with the option to blend these wines together in varying percentages later or keep them completely separate. Then, depending on the wine style, the wine will be stored separately in barrel or tank, clarified, etc.

OAK

The use of wine barrels (especially oak barrels) to store and age wine dates back centuries. Depending on where and how they were made, oak barrels will impart specific and diverse characteristics into wine. Most wine barrels are coopered (made) from French, American or Hungarian Oak. Wine aged in oak barrels is enhanced with the addition of vanilla and oak overtones. Barrels also allow for a small amount of wine evaporation and oxidation during the aging period. French oak was considered especially desirable wood for making wine barrels for many years. The five primary forests used for wine barrel production are Allier, Limousin, Nevers, Trancais and Vosges. Each of these forests produces wood with distinctive characteristics including tightness of the wood grain as well as the amount of oak flavors that are imparted to the wine. Tightly grained wood tends to impart the oak characteristics (vanilla, spice and butter flavors) much more slowly than wood with a looser grain.

BARRELS

Wood for American oak barrels is harvested primarily in the Midwest region of the United States, from the states of Missouri, Ohio, Kentucky and Arkansas. American barrels were known to be overly aggressive. This quality was blamed on the character of the wood itself, when in fact, the methods used to make barrels in America were leaving too much flavoring in the wood. When American coopers began applying French methods to American oak, the resulting barrels, while still more powerful than the French, were very well suited for wine. Additionally, American oak is richer in a compound called tyloses, which seals the pores and tubes of the wood. This means American oak is generally less porous than the French variety. Being impermeable, the American oak can be sawn into staves rather than hand-split along the grain of the wood, as is required for French oak, to prevent leakage. Sawing the oak into staves means that coopers can use more than twice as much wood from each log in stave production. It also reduces the cost of barrel production.

The use of French and American barrels of various ages provides a broad spectrum of aromas, flavors and textures to the blend, in much the same way as cooking with many ingredients improves food flavor. Winemakers select wood for their wine barrels from different forests for the effect on the finished wine. There are a wide variety of additional options available to the winemaker when it comes to wine barrels. Many winemaking regions have traditional shapes (i.e., Bordeaux barrels versus Burgundy barrels). Barrels also come in many sizes, vary in thickness of the staves and vary in construction.

During the making of oak barrels, coopers use a combination of heat (over a fire) and water to achieve its unique arched shape. After shaping, the barrel is held over the fire to create a signature toast. The length of heating results in a “toast level” on which the flavors of the wine aged in the barrel will partially depend. During the heating of the staves, some substances of the wood are caramelized and develop a multitude of aromas, such as vanilla, fresh bread, buttered bread or a touch of nut, that will be found in the final taste of the wine.

Toast level will be adjusted according to the wineries' requests: light, medium or heavy toast. Typically, the lighter the toasting of the barrel, the more oak flavors and tannins that are imparted into the wine. Heavy toast or charred, which is typical of barrels in Burgundy wine, have an added dimension from the char that medium or light toasted barrels do not impart. Heavy toasting dramatically reduces the coconut note lactones, even in American oak, but creates a high carbon content that may reduce the coloring of some wines.

During the process of toasting, the furanic aldehydes in the wood reach a higher level of concentration. This produces the "roasted" aroma in the wine. The toasting also enhances the presences of vanilla and the phenol eugenol, which creates smoky and spicy notes that, in some wines, are similar to the aromatics of olive oil or cloves. It is most common for wines to be fermented in temperature-controlled stainless steel tanks before they are placed in oak barrels for aging.

Since new barrels impart more flavors to the wine than previously used barrels, the percentage of new barrels used by a winery each year is an important stylistic tool. By the time a barrel is about 5 years old, it is virtually neutral as far as its influence on the taste of the wine.

Private Vineyard:

Your oak aging regimen will depend on your wine style and budget. Market prices and conversion rates will vary slightly from year to year, and you can elect new or used barrels from the United States, France and Eastern Europe. Used barrels do not impart as many oak tannins or toast characteristics. They are considered more neutral and are generally barrels that have been used for 1-3 years. Your winemaker will construct an oak program that fits with your wine style and desired budget. You will be able to elect the brand, toast level and origin of the barrels used in your wine program.

For Ultra Premium wines that require full oak extraction you may elect to have 200% new oak, which means that after primary fermentation in a 100% new oak barrel, you transfer the wine to another 100% new oak barrel for malolactic fermentation and aging.

For Fruit Forward wines, you may elect not to age in oak and bottle the wine soon after malolactic fermentation has finished. Or, if you want to have a fresh young wine, only a partial malolactic fermentation may be preformed to preserve bright fruit components. For Premium wines, you also can elect to use wood staves or chips to impart more wood flavors and tannins into your wine. This is a less expensive option than new oak barrels.

MALOLACTIC FERMENTATION

The malolactic fermentation (MLF) is a critical part of the red wine production process. While it is optional in white wines, the vast majority of red wines undergo this process. MLF is a process by which Lactic Acid Bacteria convert juice and wine malic acid to lactic acid and, in the process, produce a small amount of carbon dioxide. It is undertaken by the family of lactic acid bacteria: *Oenococcus oeni* and various species of *Lactobacillus* and *Pediococcus*. Malolactic fermentation is a naturally occurring process. By taste, malic acid is perceivably more acidic than the same quantity of

lactic Acid. This conversion has the effect of softening the wine, often imparting a creamy texture. Lactic Acid Bacteria can have a profound influence on the wine, including its aroma and flavor.

Pediococcus and *Lactobacillus* species have a tendency to produce spoiled or unpleasant aromas. Over the years, *Oenococcus oeni* has become the primary species of bacteria used in winemaking because of its dominance, tolerance of higher acid and alcohol, and evolution of pleasant aromatic characteristics or buttery-ness. The compound that imparts buttery-ness is diacetyl. The species of bacteria, in combination with other winemaking processes, determines the level of diacetyl that is produced and retained in the wine. Malolactic fermentation is natural but does not always occur. Typically, wineries inoculate new wine with a malolactic culture. As with native yeast, using native MLF is a stylistic choice, since the native flora is an unknown mixture of microbes and populations, and the sensory outcome is unpredictable. With modern methods and equipment, winemakers can control the degree of malolactic they desire. The growth of all Lactic Acid Bacteria is inhibited by cool temperatures and sulfur dioxide. Wines that have undergone MLF in tank or barrel are microbially stable and are unlikely to go through the conversion in bottle. Red wines that undergo no or partial MLF require prudent winemaking and sterile filtration before bottling.

Private Vineyard:

Depending on your wine style and the condition of the wine, your winemaker will choose to elect a natural malolactic fermentation or inoculate with a malolactic culture to ensure proper fermentation. For Super Premium and Ultra Premium wines, malolactic fermentation should occur in oak barrels, while Premium level wines will have the choice to ferment in either tank or barrel. You and your winemaker will decide which method to use.

SULFUR DIOXIDE MAINTENANCE

Managing proper SO₂ levels in red wines is critical. The amount of SO₂ used should be low enough to permit some oxidation but high enough to control spoilage-causing microorganisms. This can be a difficult exercise, particularly if the wine pH is high (3.6 and more). At a higher pH, the higher dose of SO₂ necessary to control microorganisms can adversely affect the taste and flavor of the wine. To avoid needing to use excess levels of SO₂, the winemaker should attempt to keep the wine pH lower, reduce microbial load by filtration before prolonged storage, and conduct all cellar operations under stringent hygienic conditions. The SO₂ levels should be checked periodically and adjusted to the proper level.

Private Vineyard:

The winemaking team will carefully monitor all wines throughout the aging process, maintaining proper topping levels in barrel and add SO₂ as needed.

RACKING

Racking is the process where wine is separated from the sediments that are allowed to settle at the bottom of the aging container. The sediments, or lees, are a byproduct of the fermentation and aging process, as dead yeast cells and other cellular material settle at the bottom of the container and can often impart distasteful flavors and aromas to the wine if not properly maintained. Depending on the wine quality and winemaking regimen, the winemaker will decide to perform racking 1-4 times per year.

Private Vineyard:

The winemaking team will create a racking regimen depending on the wine quality and wine style as well as the amount of time the wine will be aged.

CLARIFICATION

After racking, most red wines undergo additional clarification. A variety of methods are used, some more invasive than others. The most commonly used clarification technique is gravity. Because the aging regime of red wines typically exceeds 12 months, gravity can allow the wine to settle and clarify with little or no manipulation.

Private Vineyard:

For younger, more Fruit Forward styles, a clarification process may be performed to make the wine ready for market earlier. The agents and processes for clarification will be selected and explained by your winemaker.

FINING

Fining is the addition of a reactive or adsorptive substance to remove or reduce the concentration of one or more undesirable constituents. These agents can be added to the juice or wine in order to enhance clarity, color, aroma and flavor, or to modify the stability of wine. There are many different fining agents and a wide range of options for using them. Each fining agent should be used for its intended purpose. Lab tests should be performed in order to determine the proper amount for the required task. If the first attempt does not produce the desired results, it can be repeated; but using too much of any fining agent can result in undesirable effects.

Private Vineyard:

The winemaking team will evaluate your wine and determine whether it is necessary to use a fining agent to meet your winemaking style goals.

TARTRATE OR COLD STABILIZATION

Because of red wines' aging regime (>9 months) and chemistry, this tartrate instability typically resolves within the barrel or aging vessel. Furthermore, since red wines are not normally chilled or refrigerated before consumption, the tartrate instability and tartrate crystal formation are rare. For these reasons, cold stabilization of red wines prior to bottle is rare.

FILTRATION

Filtration involves the physical retention or blocking of materials on or within a fibrous or porous material. Simply put, it removes suspended particles in juice or wine to improve clarity or stability.

Filter selection is graded by a desired level of clarity, particle removal or pore size: rough, coarse, polishing and sterile (removal of microscopic components). Careful selection of the filter media is necessary, because excessive filtration can strip structure, flavor and color components from the wine.

Typically, filtration is preceded by a preliminary clarification by fining and racking. This is especially important when using membrane or ultrafiltration. Prior to bottling, white wines that contain malic acid or residual sugar are sterilely filtered through a media that removes all yeast and bacteria. Some producers choose not to chance stripping wine characters and forego any filtration. Unfiltered wines tend to have more sediment and stand a greater chance of microbial instabilities (i.e., malolactic bacteria or Brettanomyces).

Private Vineyard:

The winemaking team will determine whether this step is necessary based on the quality of the wine and your desired wine style.

BOTTLING

Prior to bottling, you will need to choose your wine packaging, which includes corks, bottles, capsules, a label design and labels. Supplies will be ordered prior to bottling. Depending on your wine style and aging regimen, this can be 6-24 months after harvest. You should begin to think about your overall wine package and be aware that there may be minimums and long lead times (as much as 3-4 months) to order custom supplies, such as corks and capsules. The Vines team will assist you through this process, helping with the decisions you need to make and with the logistics of the process.

CONCLUSION

The winemaking process is a dynamic and exciting endeavor. Based on your winemaking goals, The Vines winemaking and vineyard teams will manage your grapes through the entire process, starting in the vineyard ultimately creating your wine from your Private Vineyard.

We are excited to go through this process together with you and over time we hope that you become increasingly involved in the decision making production process. The Vines team is available to answer any of your questions along the way, and we look forward to making amazing wine together!