Dessert & Fortified Wines

Wine 3
Introduction to Enology

Tonight’s Lecture
- Dessert vs. Fortified wines
- Types of dessert wines
- Late harvest wines
- Port style wines
- Sherry production
- Special natural & “Pop” wines

Second Field Trip
- No lab tomorrow, field trip this Saturday
- 9:00 AM Woodfour Brewery in the Barlow Center in Sebastopol
- 11:00 AM Owl Ridge Winery

Dessert vs. Fortified Wines
- The definition of a “dessert” wine depends on who you ask.
  - To the TTB it is any wine, sweet or dry, with an alcohol over 14%.
  - To wine drinkers a dessert wine has discernable sweetness that is consumed by itself, or paired with a dessert.
  - Remember, a wine should be sweeter than the food it is paired with.

Dessert vs. Fortified Wines
- Some types of dessert wines are fortified with brandy to prevent the residual sugar in the wine from fermenting.
- Fortified wines are usually, but not always, sweet.
- They were once the most popular style of California wine, 1965 they were over 50% of the wine produced; now they make up about 7%, up slightly in recent years.

Styles of Dessert Wines
- There are many styles of dessert wines, most are variations of one of these three types:
  - Late harvest wines
  - Port style wines
  - Sherry style wines
- Port and Sherry are names for dessert wines made in Europe, like the term “Champagne” they are often used generically in the US.
Late Harvest Wines

- **Botrytis** affected, clusters are infected with **Botrytis cinerea**, a fungus also called Gray Rot or Noble Rot, turns berries grayish-purple.
- **Late Harvest** Legally picked at least one day later than “Early Harvest”, must label sugar at harvest and RS in the same units of measurement.

**Botrytis cinerea**

- If the harvest sugar is greater than 32° Brix usually means that the grapes were Botrytised. Botrytis is a soft fuzzy gray mold that is usually thought of as grape spoilage in most cases.

- Under specific circumstances **Botrytis** can produce an excellent dessert wine. The mold perforates the skin of the berry and under the proper conditions water evaporates out, concentrating sugar.

**Noble Rot**

- Conditions necessary for “noble rot”
  - 90 to 100% relative humidity (rain) for several days followed by <50% RH for one week with temperatures > 68°F.
  - Soft skinned varieties are the most susceptible; Sauv Blanc, Gewurtz, Semillon, Riesling. Polyphenols inhibit **Botrytis** growth so doesn’t work as well with reds.

**Noble Rot**

- The late harvest Rieslings of Germany and Sauternes (Sémillon, Sauvignon Blanc) of France are the most famous styles.
- Very sweet lots of acid, they have little oak or malolactic character.
**Effects of Noble Rot**

- Concentrates sugars and acids, these are partially metabolized by the mold, but they still concentrate due to evaporation.
- Mold consumes nitrogen and vitamins so the juice is often nutrient deficient and it is necessary to add fermentation aids.

**Encouraging Noble Rot**

- Frost protection sprinklers can be used to control humidity in the vineyard.
- In the 1960s Myron Nightingale at Beringer Winery harvested first and induced it indoors with spoors and controlled humidity.

**Harvest**

- The grapes are picked at 30° to 60° Brix, (about 40° to 45° Brix is ideal) more or less can make a finished wine that is out of balance.
- Crushing before pressing it is very hard on equipment because of low moisture content.
- Whole cluster pressing works best, either way the press cycles are long. The juice is then SO₂ adjusted prior to fermentation.

**Winemaking**

- Because of the dehydration the yield is very low; about 120 to 140 Gal./ton.
- Settling before fermentation is difficult due to protective colloids, so adding settling enzymes or filtering with a lees press is often done.
- One winery fines with bentonite, gelatin, silica gel, PVPP, carbon, and then centrifuge!

**Winemaking**

- A large inoculum of yeast (2+ Kg/1000 Gal.) is used and the fermentation is at 55 to 60°F.
- Fermentation is allowed to go until it stops on its own. The wine is then cold and protein stabilized.
- The wine is then filtered as tightly as feasible.
Why is processing so difficult?

- High solids make it hard to crush, press and pump.
- Acetobacter present on grapes makes it high VA.
- Browning from laccase and other PPOs.
- Hard to protein stabilize due to proteins from botrytis.

Why is processing so difficult?

- High sugar & low nutrients result in very slow fermentation; two or more months.
- Dirty, hard to settle and clarify due to protective colloids.
- Almost impossible to filter, although you don't always need to sterile filter because the high glucose and alcohol levels together inhibit fermentation.

Finished Product

- The resulting wine has:
  - 15 to 20% RS
  - 8 to 11% Alcohol
  - 7 to 10 g/L TA
  - Free SO₂ 30 PPM, Total SO₂ 150 PPM
- I have seen some European wines with as much as 300 PPM Total SO₂!

Finished Product

- Bottled in 375ml bottles because serving sizes are small, the key is to shoot for balance.
- Marketing can be difficult, at Kenwood gold medals did not translate into good sales.
- Classic examples are the late harvest Rieslings of Germany and the Sauternes of France.
- A great accompaniment to sweet fruit-based desserts.
- "A pain to make a joy to drink"

Ice wine or Eiswein

- Is wine made from late harvest grapes that are frozen on the vine before they are picked. After picking, they are thawed while being pressed and the sweetest juice comes off first.

Ice wine or Eiswein

- Difficult to produce in California due to the temperate climate, more common in Germany and Washington State.
- Some wineries freeze the grapes after harvest to get the effect but it is not considered true “ice wine” but it tastes very similar.
Raisin Wines

- In warmer climates grapes can be picked and partially dehydrated to concentrate the sugar. There are a number of dessert wines made in this style throughout the Mediterranean. Late Harvest Zins are made this way with the grapes left on the vine.

Port Style Wines

- Port style wines are intensely colored red with lots of tannin that are very sweet with high alcohol.
- They are consumed with desserts (the pair well with dark chocolate) or as a digestif (after dinner drink) or dessert on their own.

Port Production

- Northern Portugal in the Douro River Gorge is where Port production was born. It is a young gorge (Geologically) so the valley is just a steep canyon.

Port Production

- The vineyards are on terraces built into the rocky and poor soil. The soil is so rocky dynamite is used in some areas to dig holes to plant vines.

History

- Wine has been made in the Douro River Gorge since ancient times; Port, as we know it started to develop about 300 years ago.
- 1700, Port industry was started in the region by Englishmen who wanted wine but had bad relations with France at the time, so they imported wine from Portugal.
- Brandy was added to the wine before shipping to help stabilize it.

History

- 1800, Brandy started to be added half way through fermentation, this arrested the fermentation and made a sweet wine.
- Today, the emphasis on improving varieties, about 80 different varieties are grown in the Douro and not all of them are suited to Port production.
Grapes Grown in Douro

- Recently, table wines are becoming more important to the region; usually they are blends made of traditional Portuguese varieties.
- Grape varieties that are used for Port must give up the flavor and color quickly because they do not ferment for long.

Grapes used for Port

- In Portugal:
  - **Touriga**, Two types: T. Nacional & T. Franseca

Grapes used for Port

- **Touriga Nacional**
- **Touriga Franca (T. Franseca)**

Grapes used for Port

- **Grapes Grown in Douro**
  - Tinta Barroca
  - Tinta Roriz, also known as Tempranillo

Grapes used for Port

- **Tinta Cão**, Tobacco smell (Tinta = ink, Cão = dog)
- **Souzão**, Coarse wine, moderate color, spicy aroma.

Grapes used for Port in California

- **Tinta Madera**, has a brown sugar taste.
- **Zinfandel**, Tendency to get overripe, not enough backbone.
- **Syrah**, Good choice, aromatic.
- **Petite Sirah**, good color and acid.

Grapes used for Port in California

- **Barbera**, Good acid, plum character.
- **Cab Sauv**, Good for adding complexity if it is a minor part of the blend.
- A few California producers use traditional Port varieties.
Traditional Methods for Winemaking

- Done on small wineries on farms, Quintas, (pronounced Keen-taz).

The grapes are picked at about 23-24° Brix and are fermented in shallow stone troughs called Lagare.

- To crush them they are trodden and they are then tread on continuously in the lagare throughout the fermentation which lasts for 24 to 72 hours.

- Only 5% of Port is still trodden, most Quintas now use troughs are made of stainless steel that are mechanically mixed to mimic treading.

- Many Quintas also use autovinification tanks; these are special types of tanks that use CO₂ pressure from the fermentation to pump over the must.

Traditional Methods for Winemaking

- Port is regulated by the Port and Douro Wines Institute (IVDP).

- The IVDP Controls viticulture and wine production. Authorizes and subsidizes planting of specific varieties, distributes fortifying brandy. It also controls labeling, seals on corks, declares vintage years.
When the wine reaches about 12° Brix it is pressed and fortified with un-aged Alembic (Cognac style) distilled brandy (140 to 170 proof) to 20% alcohol.

There is a formula to calculate the proper amount of brandy to be added for fortification.

**Formula for Alcohol Addition**

\[
X = \frac{V(C-A)}{B-C}
\]

- **X** = Volume of Brandy
- **V** = Volume of Wine
- **A** = % Alcohol of base wine
- **B** = % Alcohol of Brandy
- **C** = % Final Alcohol of Port

**Example:**

\[
\left\{440 \text{ Gal} \: (19.5\% - 8.85\% \right) \div \right) \frac{71.59\% - 19.5\%}{71.59\% - 19.5\%} = 4686/52.09 = 89.95 \text{ Gallons}
\]

Fortified after pressing because you do not want to over extract the skins or lose expensive brandy with the pumice.

In California, it is illegal to fortify on the skins but this is sometimes done to get better color and extraction from the skins.

It is difficult to press at exactly the right sugar level; having multiple lots for blending helps.

After fortification the port is mixed for about 2 hours to drive off CO₂ then placed in a "pipe" (120-gallon oak barrel).

The wine sits for several months before being shipped to a blending house for finishing.

Many of the blending houses were founded and are owned by the British, (as evidenced by their names: Dow's, Taylor, and Cockburn's).
These houses are found on the mouth of the Douro River and the casks were originally shipped by small boat down the river, blended and then shipped to England.

Types of Port

- **White Port**  Fermented on skins and aged in casks similar production as in red port.
- **Ruby**  The youngest port, ruby color, fruity & fiery aged 3 to 5 years in a cask.
- **Tawny**  The edge of the wine takes on a light brown color and the wine has a lighter color of red, takes on a nutty aromatic character, it is aged for 8 to 40 years in a cask, already oxidized so it does not spoil after opening.

**Types of Port**

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**Vintage Character**  Dark color, full bodied, rich, aged 5-7 years usually higher quality than ruby. The most common type of port bottled.

**Vintage**  The "best", bottled after 2 years meant to be aged 10 to 20 years in the bottle, about 1 in 3 is declared a vintage if quality and quantity are good enough, carries a vintage date.

**Late Bottled Vintage**  Vintage dated from a good year, full bodied, dark color, 4 to 6 years old when bottled, not meant to be bottle aged.

**Sediment in Vintage Port**

Most ports will throw a sediment in the bottle (especially vintage) this is not considered a fault and the bottle can be decanted to remove the sediment.

**Single Quinta & California Port**

- Most Port is blended by a Port house however, there is some very fine ports made from one "Quinta" (estate vineyard).
- In California, very few producers make port in the traditional style. Usually all that "Port" means is "sweet, fortified red wine".
- California producers seldom use Alembic brandy and often the grapes are picked much sweeter than with true Port.
California “Port”
- You cannot sell “California Port” in Europe because to them Port is a region, not a type of wine. One California producer calls his port style wine “Starboard” to get around this rule.
- Like the term “Champagne” you have to have historically used the term “Port” to be allowed to use it on an American wine.

Zinfandel Port
- Not a classic Port style, more of a hybrid between late harvest wine and port.
- Traditional Port is picked at about 24º Brix.
- With Zinfandel Port the grapes are allowed to partially dehydrate to a high sugar level.

Zinfandel Port
- After crushing the raisins in the must release their sugar and the must can get as much as 30º Brix.
- Fortified with high proof when it ferments to the desired sugar level.

Sherry Production
- Sherry is a fortified wine with that can be either sweet or dry and has an oxidized character. There are many different types of sherries “one for every occasion”.

Sherry Production
- Its origin is from around the town of Jerez de la Frontera in Spain. Sherry is a mispronunciation of Jerez (her-reth)

Grapes
- Palomino is the classic Sherry grape it makes a low acid relatively nondescript wine. It makes up about 95% of vineyards.
The other two varieties used for Sherry are Pedro Ximénez and Muscat of Alexandria.

Winemaking
- The grapes are picked at 22 to 26 °Brix, some grapes are placed on mats and allowed to dehydrate to achieve this level.

Winemaking
- Crushing and processing are carried out in the normal white wine fashion with low skin contact and low SO₂ added. The juice is then fermented in temperature controlled stainless steel tanks.
- Sherry is fortified after fermentation whereas Ports are fortified during fermentation.

Sherry Winemaking continued
- After initial fermentation, the wines are fortified with pot still brandy.
- The alcohol helps to prevent the growth of Acetobacter during the aging (Acetobacter has trouble above 16% alcohol).
- The wine is then placed in 600 L (160 Gal.) barrels called butts.

Barrel Aging
- In Fino Sherries the barrels are filled 3/4 full, this allows a place for the growth of flor yeast (Saccharomyces fermentati)
- Layer of Flor yeast in barrel

Flor yeast
- Flor yeast grows in the presence of oxygen to produce acetaldehyde from ethanol and acetic acid.
- The layer of flor yeast comes and goes with seasons, growing more quickly during the summer, and lasts for several years.
- Flor yeast has a narrow range of alcohol tolerance between 15 & 16%, below 15% Acetobacter grows, above 16% flor yeast dies.
Barrel Ageing Sherry

- At the end of flor fermentation, acetaldehyde reaches a level of about 300 mg/L and the wine is very low in VA. The acetaldehyde gives the wine a "nutty" flavor and other flavor components are produced.
- The wines are traditionally aged in a fractional blending system called a solera the barrels are arranged in four to eight tiers with the youngest on the top.

Barrel Ageing Continued

- Soleras take at least 15 years to start producing good Sherry and they improve with age because the average age of the wine grows older as time goes on. Most soleras have from 5 to 12 tiers.
- "No one sets up a solera for themselves, they do it for their grandchildren."

Why was Sherry so popular?

- Prohibition helped to popularize Sherry.
- It had **Heat**, enough alcohol to get you buzzed.
- It was **Sweet**, to cover up the heat.
- It was **Cheap!**
- Also you did not have to finish the whole bottle in one sitting because it was already oxidized!

Types of California Sherry

- **Submerged Flor**
  In an effort to hurry up the flor fermentation the wine "shermat" is inoculated with flor yeast and sparged with oxygen until the desired level of acetaldehyde is reached (200 to 1000 mg/L).
Types of California Sherry

- Baked Sherry
  After fermentation and fortification the wine is baked at 125°F for weeks with the pH at 3.4 to 3.6 and then aged in American oak to smooth out some of the baked character.
  - This is actually closer to Madeira production but it has always been called California Sherry.

Homemade Sherry

- A good homemade Sherry can be made fortifying a neutral, dry white wine, letting it oxidize and then adding sugar before bottling. Much of the quality depends on the fortifying agent used.

Other Dessert Wines

- Angelica is a sweet fortified white wine that was made first in California during the mission period. The wine is fermented down to about 1% and then fortified with brandy to 18% Alcohol.
  - The Mission grape was the traditional grape that was used. Sometimes the grape juice was added to a dry wine to make sweet angelica.

Pop wines and Flavored wines

- As late as the mid seventies they accounted for as much as 20% of wine consumption in the US, now it is much less.

Pop wines and Flavored wines

- These are allowed under TTB category “Special Natural Wine”.
  - Special because they have a proprietary recipe registered with the TTB and Natural because only natural flavorings are allowed, most are very sweet.
  - Often, but not always, fortified.
  - Started in 1957 with Gallo Thunderbird, (white port & lemonade mix).

Serving Suggestion

- Examples:
  - Fruit flavored wines (grape wine with added fruit juice) ~ Arbor Mist.
  - Wine coolers and Sangria
  - Chocolate port
  - Vermouth
Pop wines and Flavored wines
- Pop wines are usually preferred by novice wine drinkers and sell well as long as there is lots of advertising to support them.
- Fortified special natural wines are popular with “winos” because they have a high alcohol to cost ratio.

New Dessert Wines?
- New types of dessert/sweet table wine have had strong growth in recent years. At 2 to 4% sugar and moderate alcohol 10 to 11%,
- They are not as sweet as most dessert wines, but they are much sweeter than most table wines.
- Big sellers in the Midwest.

New Dessert Wines?
- Examples:
  - **Moscato**, a sweet wine white wine made from Muscat.
  - **Sweet Red**, a sweet red wine made from a blend of red grapes. Often sold under a proprietary name.

In Summary
- There are also many propriety styles of dessert wines being made in California.
- They were the most popular type of wine made in California from the end of prohibition until the 1960s.
- Although they are not as popular today, there are still some very fine dessert wines made in California.

In Summary
- Unfortunately, some producers use dessert wines as dumping grounds for spoiled and mediocre wines.
- The key to success is to make the effort to produce a good quality wine and to keep the quantity low because demand is not high.

Final Projects
- You should have your wine for the final project selected by now and emailed me on your plans.
- Talk to me if you have any questions and you will give the presentation during the final lab meeting.
Next Week

- Remember, no lab this week, Field trip on Saturday
- Next Week: Wine Law & record keeping
- We wrap it all up with the final lecture & review.