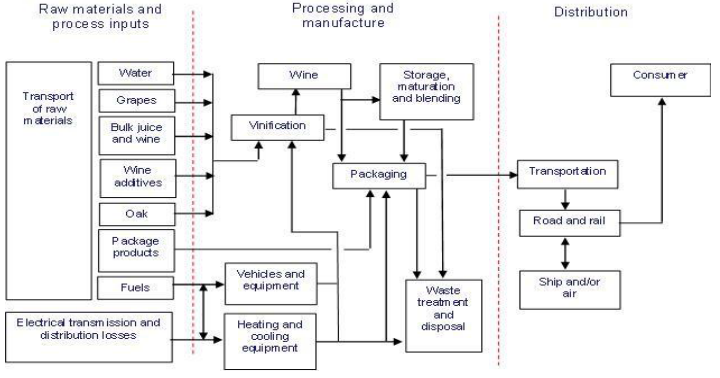
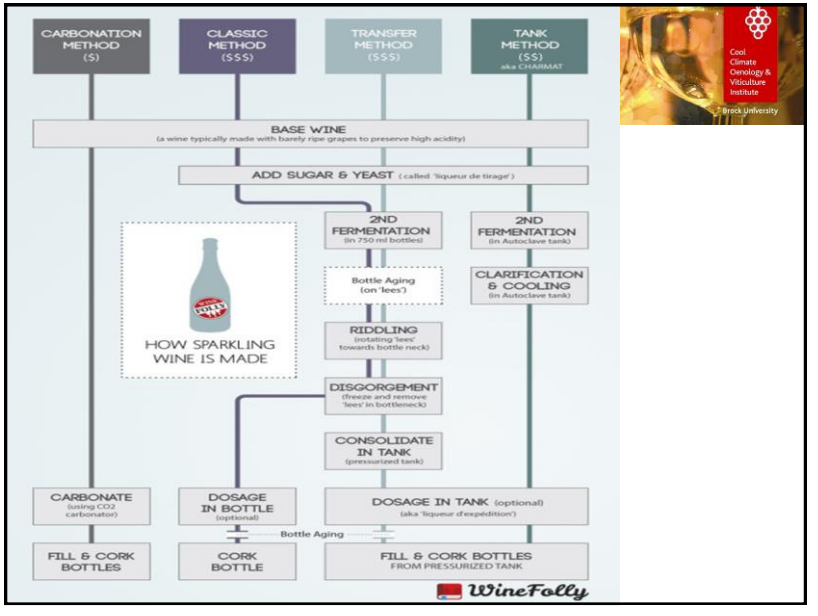
CONTENTS

1. Sparkling wine production methods
2. Equipment costs, energy usage and labour costs of sparkling wine production
3. Rosé Method Choices - Destem - Maceration, Saignée, blending white & red wines
4. Equipment costs of rosé wine production
5. Potential trends in sparkling and rosé wine

Winery supply chain showing fuel and energy inputs



Winery supply chain showing fuel and energy inputs
(adapted from Forsyth et al. 2008 by Smith and Nesbitt 2014)



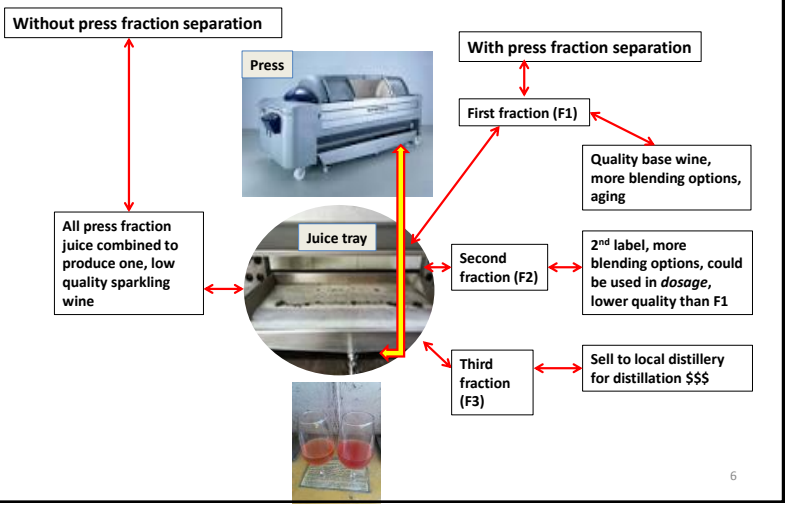
Traditional method of sparkling wine production

(Kemp et al. 2015)

GRAPE PRESSING AND JUICE FRACTIONING
↓
ENZYME ADDITION AND SETTLING/RACKING
↓
YEAST & NUTRIENT ADDITION FOR FIRST FERMENTATION
↓
MALOLACTIC FERMENTATION (if required)
↓
RACKING AND BLENDING
↓
STABILISATION & FILTRATION
↓
TIRAGE ADDITION
(wine, yeast, sugar or grape juice, adjuvants & nutrients)
&
BOTTLING
↓
SECOND FERMENTATION
↓
LEES AGING
↓
RIDDLING
↓
DISGORGING
(removal of yeast lees)
&
DOSAGE ADDITION
(Wine, sugar, SO_2)
↓
CLOSURE

Simplified flow chart of bottle-fermented wine production stages.

Presses and press fractioning options



Ingredients and equipment

- Press/pump
- Enzymes - tank
- Sulphur dioxide – press and tank
- Yeast – tank and bottle
- Nutrients (Diammonium phosphate (DAP) and thiamine) – tank and bottle
- Lactic acid bacteria – tank
- Temperature control tanks for fermentation & MLF
- Oak barrels?
- Bottling line
- Storage (no light/temperature control)
- Riddling equipment and space (lighting & temperature)
- Disgorging- neck freezer/corking machine/*dosage* equipment (lighting and temperature)
- Packaging and labelling machine

Equipment prices

- All prices include delivery
- All equipment is based on 300 – 800 bottles an hour

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TANKS

TANKS – Rosé and method traditional sparkling wine

- 50hL open fermenter with cooling jackets and rectangular door (valves included): **$11,800**
- 52hL closed tank with cooling jackets and elliptical front door (valves included): **$11,200**
- 33hL closed tank with cooling jackets and elliptical front door (valves included): **$6,500**

Charmat

- 30hL Charmat tank up to 9 bars of pressure. This tank is ASME certified for use in Canada under the pressure vessels act: **$30,000**

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Filters and pumps

- Lenticular filter (for traditional method sparkling wine) 12”x2-high: **$4,200**
- Liverani Minor flexible impeller pump with 4-wheel cart, variable frequency drive and remote: **$6,000**
- Bottling: Counter pressure filler: **$35,000**

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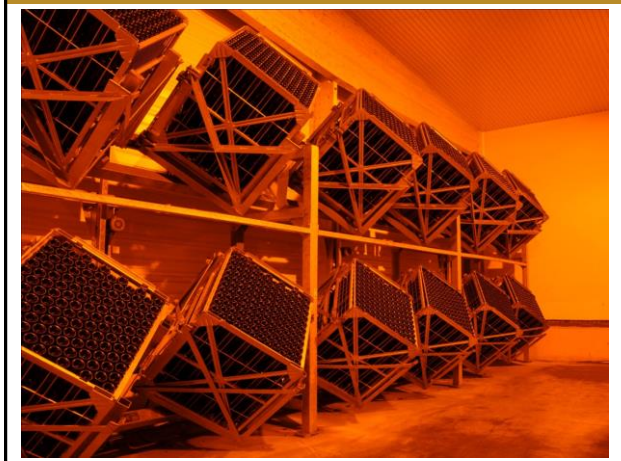
Riddling
(Photograph by Prof Richard Marchal)



- **Riddling:** Gyropalette double unit: **$19,000**
- Riddling cage (504 bottles): **$500 each**

Riddled cages waiting for disgorging – storage space!
(Photograph by Prof Richard Marchal)

Traditional method sparkling wine

Disgorging

Neck Freezer: **$5,700**

Valentin Disgorging line: **$36,000**

Cork and cage machine: **$25-30,000**

Bottle Washer: **$8,000**

Packaging/labelling

- Enos Labeller: foil placement, double pleating, bottle orientation, front/back labels, Champagne neck label: **$50,000**

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Glass bottle prices

	Price per bottle (+ delivery)
Champagne glass bottle (from Italy and France)	$2.00
Light Weight Sparkling bottle (3atm spumante style)	$0.65
Bordeaux stelvin flint bottle	$0.45-$0.55




Tirage and *dosage* costs

Production figures for 100L of wine in an existing winery *(costs exclude tax)*

Based on 100L of sparkling wine			
	WINE	PACKAGING	TOTAL
Tirage (incl additional wine, bidules, crown caps, bottles)		260.83	260.83
Disgorging (incl corks & muselet)	316.51	78.49	395
Labelling/packaging (foils)		43.85	43.85
			699.68

The use of oak for high end sparkling wines – 1st fermentation?

(Ed Carr, Head Sparkling winemaker, Accolade Wines, Australia)

OAK OPTIONS: (not including oak aged *dosage*)

New oak:

Juice is fermented in small format oak (<500 l) from 1st – 3rd use. In this situation the oak characters (toast, char, tannin) are quite intense and the use of such components usually ranges between 5 and 10% of the final blend.

The use of oak for high end sparkling wines – 1st fermentation?

Old oak:

Primary fermentation is either in small or large (500 to 5000 l) oak vessels of 5th use or older. With this option the wood influence is lower and generally constitutes between 30 to 100% of the blend. Wines produced via fermentation in old oak tend to show more viscosity, oxidative character and relatively advanced aging.

Oak aging

Reserve wines for NV

- **Older oak is commonly used for reserve wine and often in a solera approach in Australia.**
- **Lees may also be incorporated for additional character.**
- **This method will enhance aging and palate weight and depending on SO_2 regime influence extent of oxidative character.**

Reduction of production costs

- Contract work for local wineries - Outsource production to another winery
- Outsource specific stages of production: bottling (to a winery or mobile bottling line), storage, disgorging & *dosage* addition & labelling
- Joint ventures
- Borrowing/hire of equipment/space in an existing winery

Reduction of production costs

- Produce other bottle-fermented drinks i.e. sparkling cider, sparkling pear wine/cider or other sparkling fruit wine
- Consider cuvee closed/tank method wines offered in bottles, small bottles, kegs or cans
- Opportunity for new business i.e. sparkling wine bottling line company and/or disgorging and *dosage* company

Rosé sparkling wine

For those making rosé sparkling wine, what methods are you using to get sufficient colour without contributing excessively bitter phenolics?

- Best way to retain colour is NOT to blend white and red wines but to use one or more red varieties with skin contact.
- Fermentation by variety= more blending options
- Destem red grapes - soak for 12-24 hours then remove from skins. Avoid stems. Gentle punchdown

Still rosé winemaking: Bleeding, pressing, limited maceration and run off

- **Saignée/bleeding:** Let the grapes' weight do the crushing. Remove juice from vat. Wines made like this have a very pale color e.g. a rosé wine from the Loire Valley = rich, fruity and fresh.

- **Pressing** until the juice has the colour the winemaker requires. Only use pressed juice to make the wine.

Still rosé winemaking: Bleeding, pressing, limited maceration and run off

- **Limited maceration** = most commonly used method for making rosé wines. Leave skins in contact with juice until desirable colour is reached. Wine/or juice (- the skins) is then transferred to another tank to finish fermentation. If pressed off skins before fermentation = more colour extraction than pumping wine into tank.

- **Run off** = juice removal from fermenting red wine. This method results in a darker/more intense red wine.

Rosé winemaking quality

Short skin contact preserved with cool-temperature winemaking and early bottling produces rosé wines with aromatic flavours from ethyl esters, acetates and alcohols.

Sparkling wine trends

- Indigenous, resurrected and alternative grape varieties
- Sparkling wine sales from SAQ

Catégorie	Croissance 5 ans (%)
Champagne	37%
Mousseux	24.4%
Vin rosé	8.7%

- In Ontario rosé wines were the 2nd biggest sales increase in LCBO
- Many styles of sparkling and rosé wines – what will make yours different, appealing and innovative?
- Wine consumers are constantly searching for something new, innovative and creative which could be half bottles of sparkling rosé, packaging, grape variety/blend etc

Important points

- Cost differences!!
- Market demand for wine style
- Local, national or international market (determined by volume, price)
- Opportunities for new businesses i.e. mobile sparkling wine bottling line or disgorging and *dosage* service with *dosage* trials included
- Every stage of sparkling winemaking can negatively and positively effect flavour, aroma and sparkling wine quality

REFERENCES and ACKNOWLEDGEMENTS

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2) Belinda Kemp., Hervé Alexandre., Bertrand Robillard and Marchal, R. (2015). Effect of Production Phase on Bottle-Fermented Sparkling Wine Quality. Journal of Agriculture and Food Chemistry. DOI: 10.1021/jf504268u

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