



**MID ATLANTIC BREWERS SYMPOSIUM**  
**Wood & Barrel Aging**  
**September 8, 2017**

**KEYSTONE**  
**FERMENTATION SUPPLY**



# KEYSTONE



## FERMENTATION SUPPLY

Pennsylvania-based international distributor of specialized products catering to the beer, wine and spirits industries

Dynamic supply of new & used barrels, casks, & foudres

Distributor for Western Square, the world's leading manufacturer of barrel racks

Diverse portfolio of tanks & processing equipment from Enolitalia/EnoToscana

Logic Cleaners, ventilating bungs & other accessories

[www.keystonefermentationsupply.com](http://www.keystonefermentationsupply.com)





# Fantastik Imports/Exports LLC

US-based International Trade Business with relationships across Italy tied heavily to the wine/ winemaking industry

Product portfolio includes:

Finished Bottle/Bulk Wine • Wine Grapes • Olive Oils  
Oak Vessels and Containers • Enological Production Equipment

Focused on quality and customer service

Routine visits to Coopers, Wineries, and Grape Growers

Fantastik Imports/Exports LLC handles/controls all importation and customs brokerage for customers

Over 50 years experience in International Trade

**KEYSTONE**  
FERMENTATION SUPPLY



# COMMERCIAL *Wood* SYMPOSIUM & RESTAURANT INDUSTRY NIGHT

Monday September 18th 6:30-9:30pm



Learn about aging beer in wood



Get hands-on with wood vessels of many sizes



See the latest in barrel maintenance tools



Gain insight into sourcing casks and foudres

## WOOD AGING PANEL DISCUSSION - 7:30pm



Dan Popernack



Jeremy Myers

free will  
brewing co.

John Stemler



Scott Rudich

Sample wood-aged beers from panelists and local breweries!

Sample wines & ciders from **STONE & KEY CELLARS** and **HAYMAKER MEADERY** to add to your tap list!

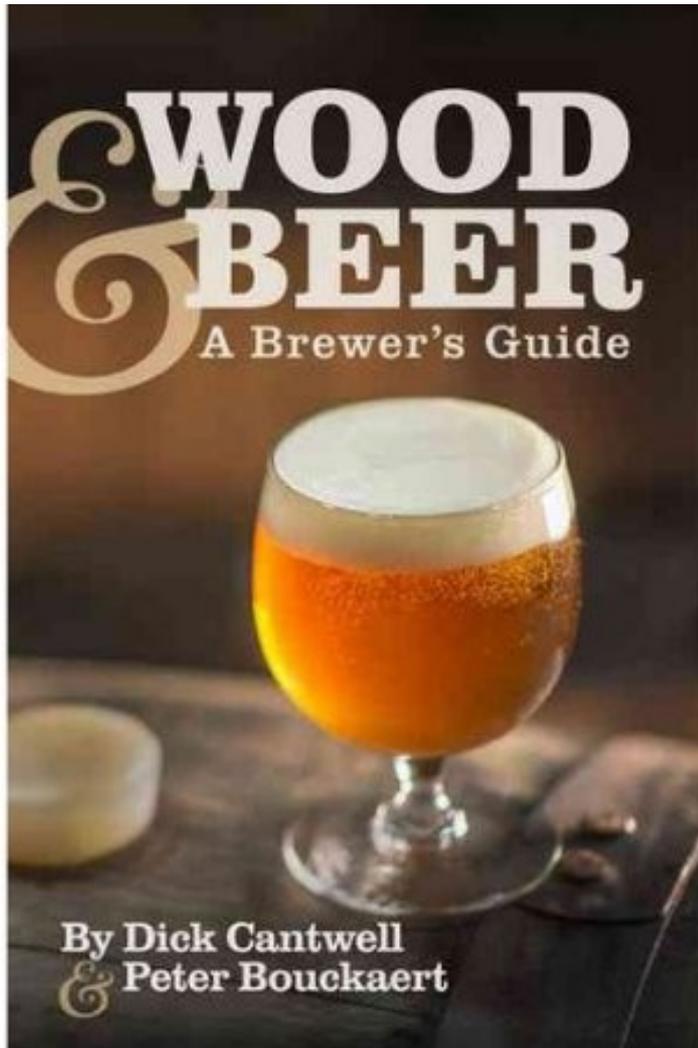
Bring wood aged products for restaurant and bar managers to samples!

Light snacks & beverages will be served by local providers!

Stone & Key Cellars 435 Doylestown Rd Montgomeryville, PA 18936 • Call 215-855-1019 for more info!



BACKYARD  
BEANS COFFEE  
COMPANY



# Wood & Beer

## A Brewer's Guide

Dick Cantwell & Peter Bouckaert

Brewers Publications

June 7, 2016

228p

ISBN-10: 1938469216

ISBN-13: 978-1938469213

# Cooperage

## A Treatise on Modern Shop Practice and Methods: From the Tree to the Finished Article

Joseph Bernard Wagner

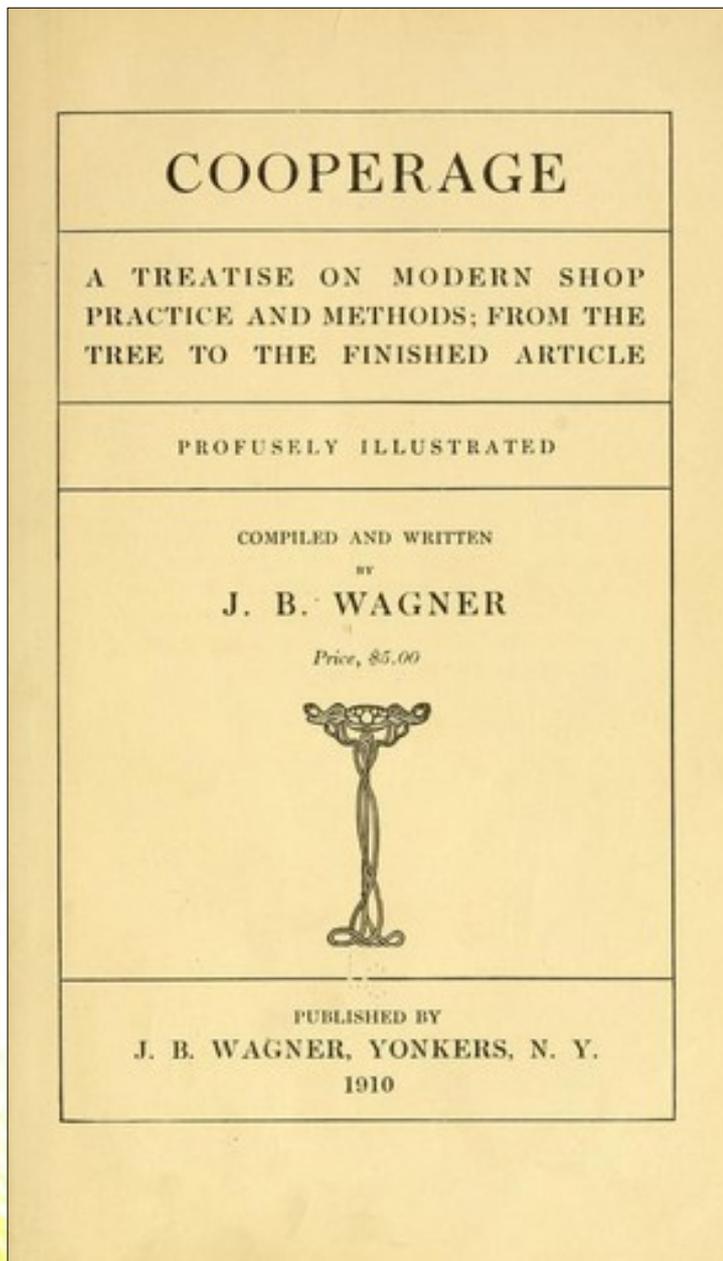
J.B. Wagner, Yonkers, NY

Published: 1910

448p

ISBN-10: 1332342736

ISBN-13: 978-1443738323





<http://www.milkthefunk.com/>

<http://www.milkthefunk.com/wiki/>

<http://www.milkthefunk.com/forums/>

<https://www.facebook.com/groups/MilkTheFunk/>

# Wood/Vessel Terminology



# A little barrel history...

Before barrels – “amphorae”

Barrels developed in northern Europe

Between 1000 and 500 BCE

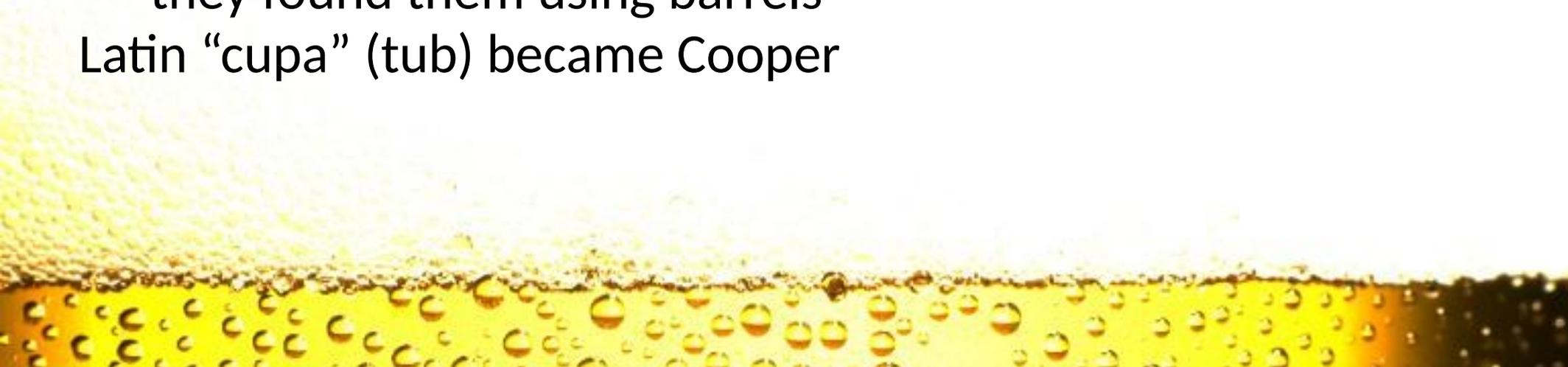
Ubiquitous shipping containers

Contents: Meat, fish, sugars, syrups,  
soap, butter, tobacco, vegetables,  
nails, hats, etc

When the Romans conquered Gauls (France)

they found them using barrels

Latin “cupa” (tub) became Cooper



# Terminology

## cask

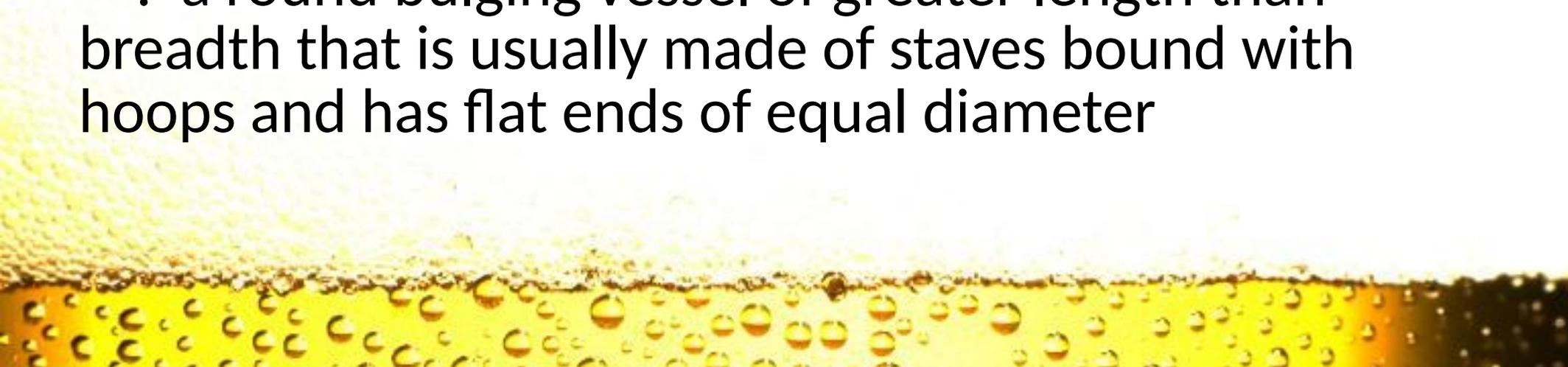
noun \ˈkask\

: a barrel-shaped vessel of staves, headings, and hoops usually for liquids

## barrel

noun bar·rel \ˈber-əl, ˈba-rəl\

: a round bulging vessel of greater length than breadth that is usually made of staves bound with hoops and has flat ends of equal diameter



# Terminology

Vessel Size	KFS	Italy	Belgium	France
5L - 450L	Barrel		don't even go here...	
500L	Puncheon			
500L+ (horizontal)	Cask	“Botti”	Foeder	Foudre
500L+ (vertical)	Foudre	“Tini”	Foeder	Cuvé

## Dutch - “Foeder”

Names vary by country and industry

Nomenclature often depends on contents



**Other terms:** butt, demi-muid, feuillette, hogshead, pipe, quartercask, etc.



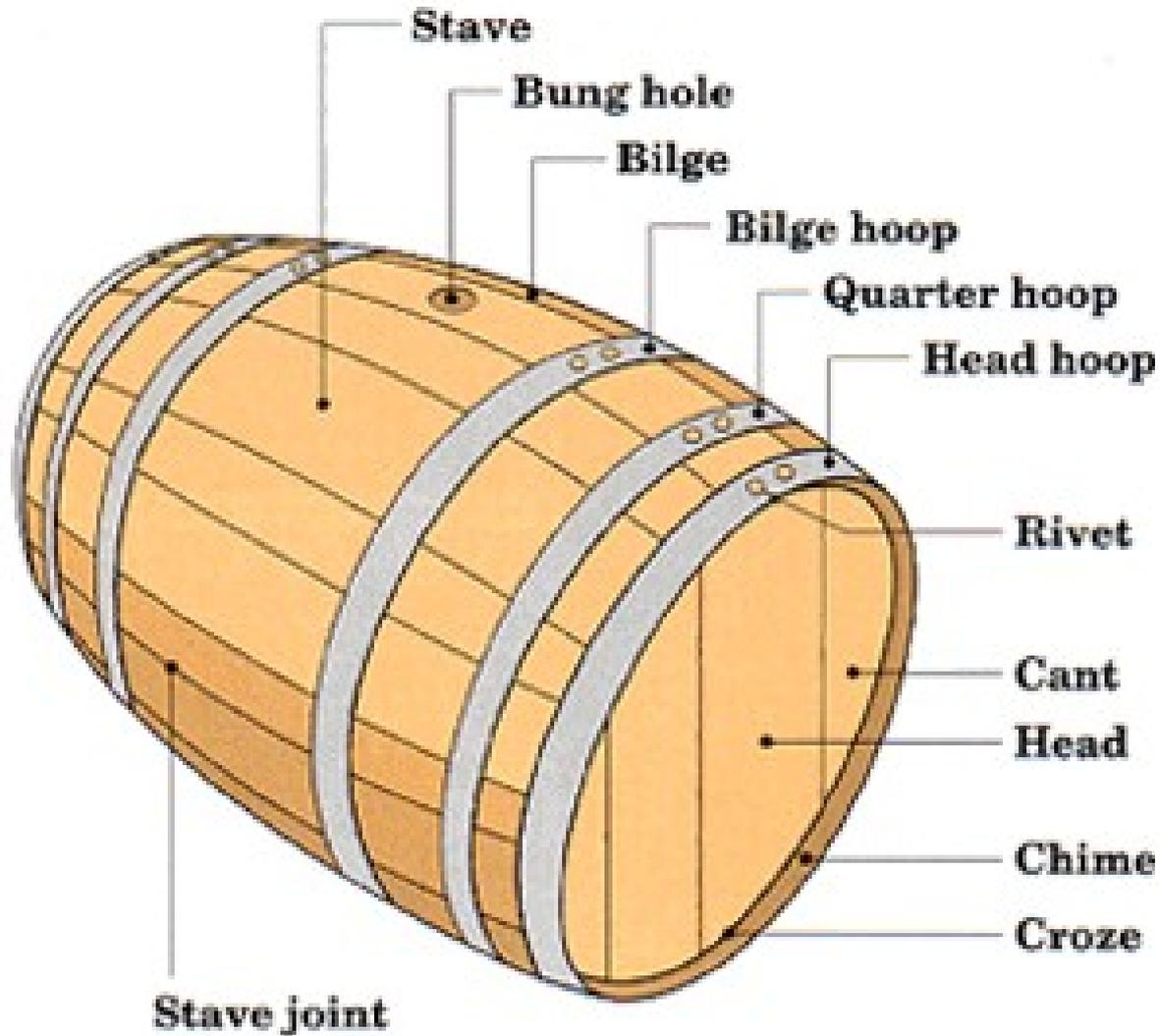
# Terminology



## F.lli Romualdi Mastri Bottai S.R.L.

F.lli	“Fratelli”	Brothers
	“Mastri Bottai”	Master Coopers
S.R.L.	“Società a Responsabilità Limitata”	Limited Liability Company

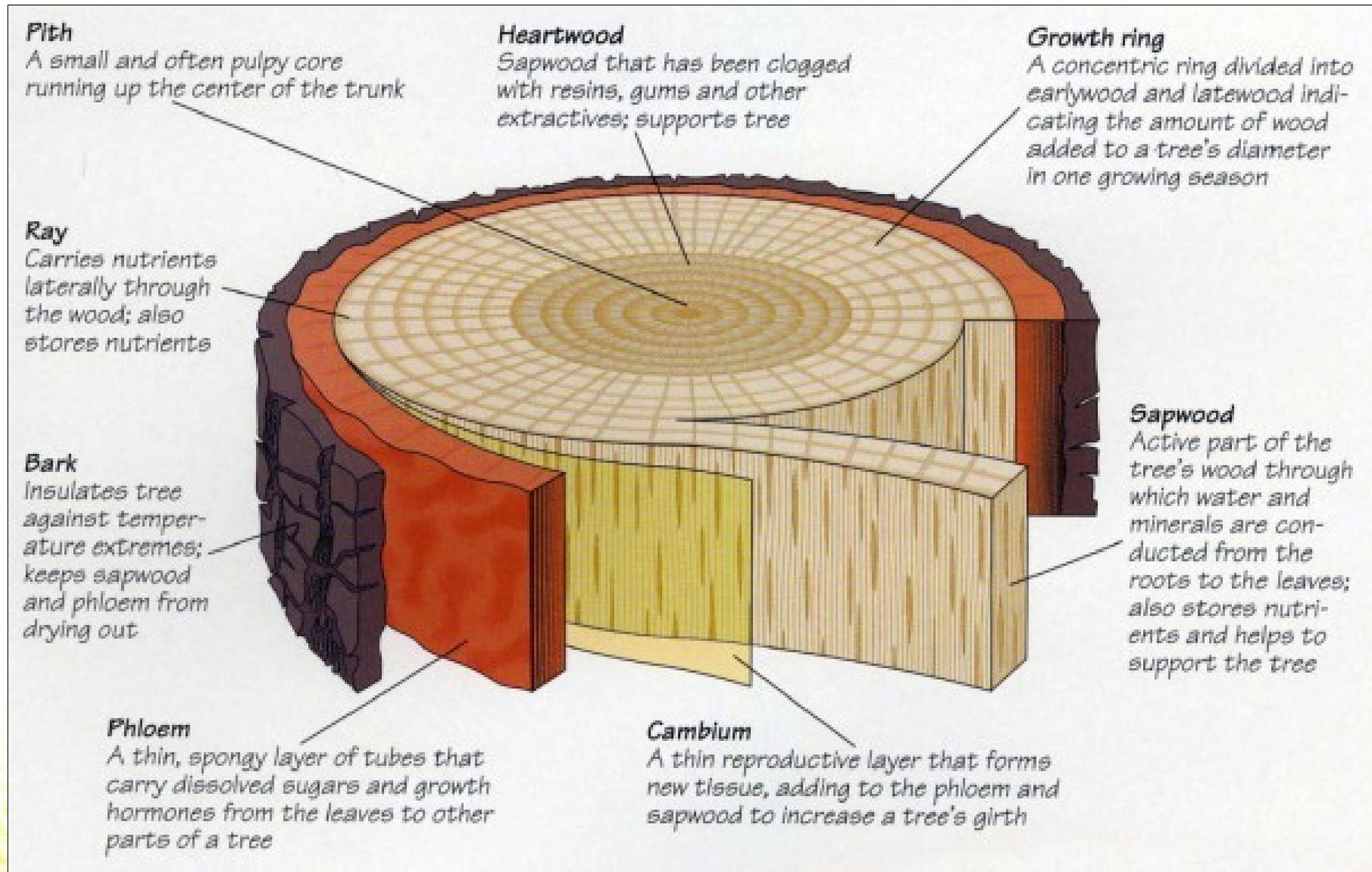
# Terminology



# Wood Types/Characteristics



# Anatomy of a Tree



# Harvest

Most trees harvested are at least 70 years old

Often 150 - 200 years old

American Oak harvested youngest - grows fastest

Some European species 300+ years

Selection done by taste (hole at base)

Moisture content at cutting:

65% - 80%

Split or cut such that the  
medullary rays run  
perpendicular to the plank



# Harvest

After cutting, wood must be seasoned

Seasoning washes out harsh flavors

Softens tannins

3-5 years typical (especially for foudres)

Stacked closely but must allow passage of air

Some coopers rinse with water to wash away harsh  
tannins and impurities

1 yr of drying for each cm of thickness

Some producers try to shorten the process



# Wood Selection

## Split vs Sawn

Splitting less efficient and more difficult

Often necessary with French/European Oak  
(weaker medullary rays)

20% claimed as staves when split – 50% when sawn

French Oak generates less tylose

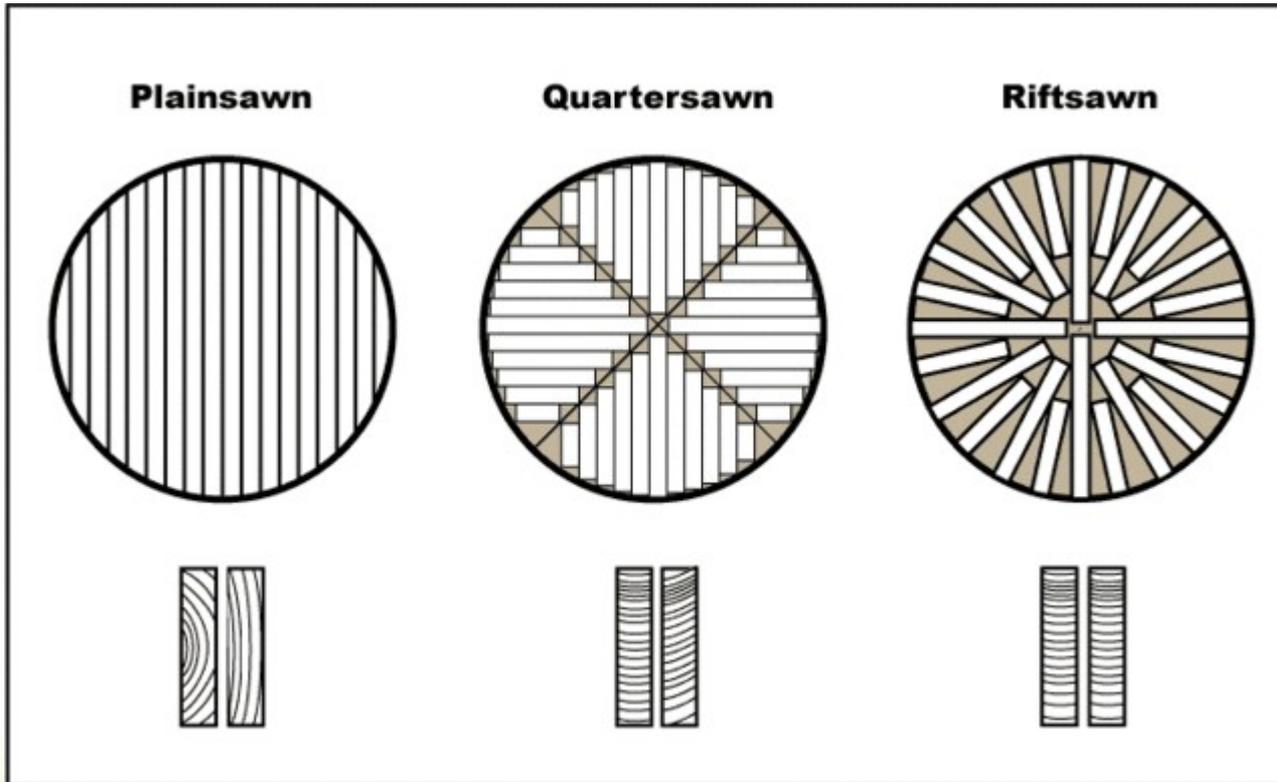
More open and pourous grain than American Oak

Often must be split

Foudre staves must be sawn



# Wood Selection



# Wood Selection

## Oak (Quercus)

Dominant wood for barrels

Light (comparatively), maleable, high tensile strength

Relatively impermeable to liquid

Semi-permeable to air / Splits well

Substantial Medullary Rays visible to splitter

Low resinous content (off flavor contributor)

Flavor compounds can be strengthened through heat treatment

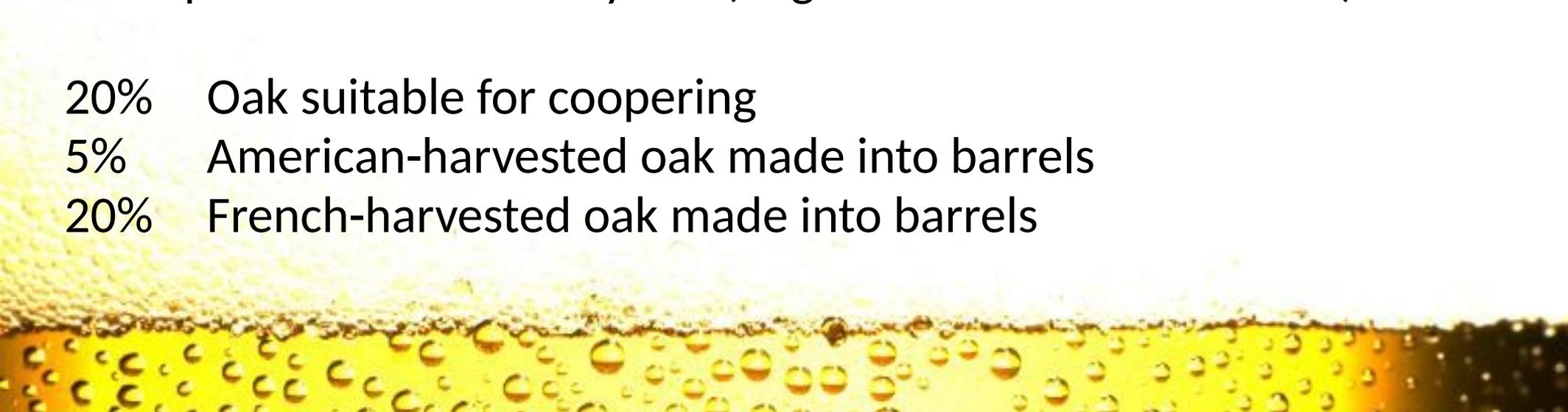
Slow-growing – contributes to tight grain

Sap channels fill with tylose (degraded from channel walls)

20% Oak suitable for coopering

5% American-harvested oak made into barrels

20% French-harvested oak made into barrels



# Wood Selection

## American vs European Oak

European Oak carries 2.5x more phenols and water-soluble components than American Oak

European Oak contributes more dark color

Similar flavor after more than 3 uses

European oak releases tannins and flavors more slowly than American Oak



# Wood Selection

## French Oak/Sessile Oak (*quercus sessilis*)

Considered superior for its fine grain

Richer contribution of flavor components

- Vanillin and its derivatives

- Lactones and tannins

- Phenols and volatile aldehydes

Tannins are silky and transparent

Sense of sweetness combined with delicate fruity flavors

Spices and toasted almonds

Ripe red fruit flavors (red wine)

Peach, exotic fruit and floral aromas like jasmine and rose, depending on the grape variety used (white wine)



# Wood Selection

## American Oak/White Oak (*quercus alba*)

American Oak can be sawn - French oak must be split

Comparatively economical

More pronounced oxidation and a quicker release of aromas

Helps wines to lose their astringency and harshness quickly

Wood of choice for shorter breeds (6 to 10 months).

Interacts harmoniously with fruit

Wide range of complex aromas, soft and attractive tannins

Wood, clove, tobacco, toasted bread and coffee

Raspberry, blackberry and currant

# Wood Selection

## European Oak

Any of a mix of Eastern European oaks

Hungary, Lithuania, Romania, Russia,  
Slovakia, Slovenia, Ukraine

Characterized by very powerful soothing aromatic aldehydes  
Ideal for aging wine with great complexity in its origin

“Regarding intensity, [this wood] contrasts the impetus of  
American oak and delicacy of the French”

Enjoying renewed interest among winemakers  
Cheaper alternative



# Other Popular Species

## Acacia (Acacia)

Popular for white wine aging (sauvignon blanc)

Provides body and texture with some tannin

Less sweetness and gentler flavors and aromas than toasted oak

“Subtle touch” alternative to oak

## Ash (Fraxinus)

Popular in Genever (gin) spirits

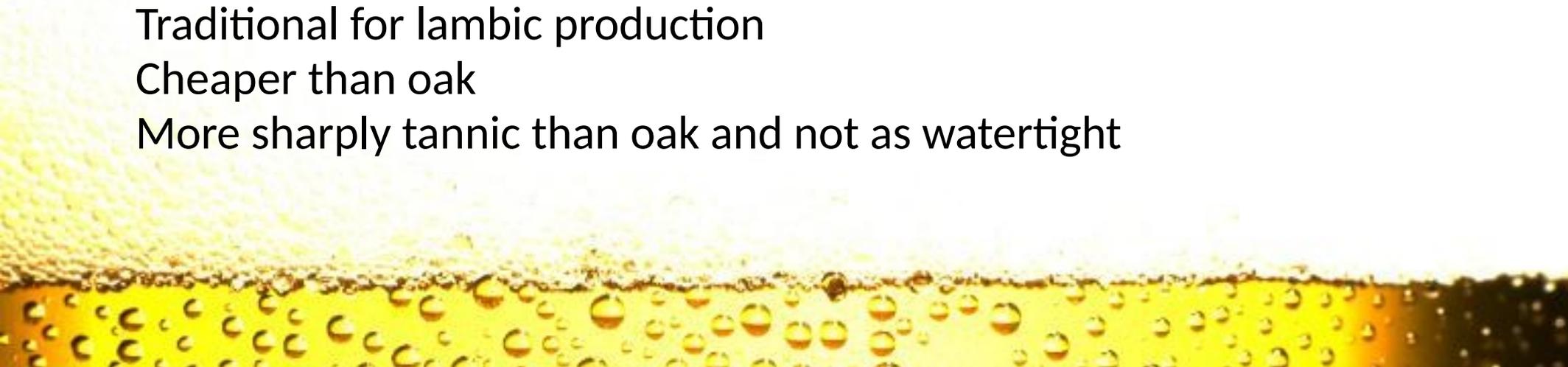
Also used for dowels, baseball bats, jousting lances

## Chestnut (Castanea)

Traditional for lambic production

Cheaper than oak

More sharply tannic than oak and not as watertight



# Other Popular Species

Beech, Cedar, Cherry, Cypress, Douglas Fir,  
Eucalyptus, Juniper, Larch, Palo Santo, Pecan,  
Pine, Spruce, Walnut



# Selecting a Vessel



# Selection

## Questions to ask:

What are you trying to achieve?

How/how often will you use it/them?

Virgin, wine or spirit? (Tobasco? Vinegar?)

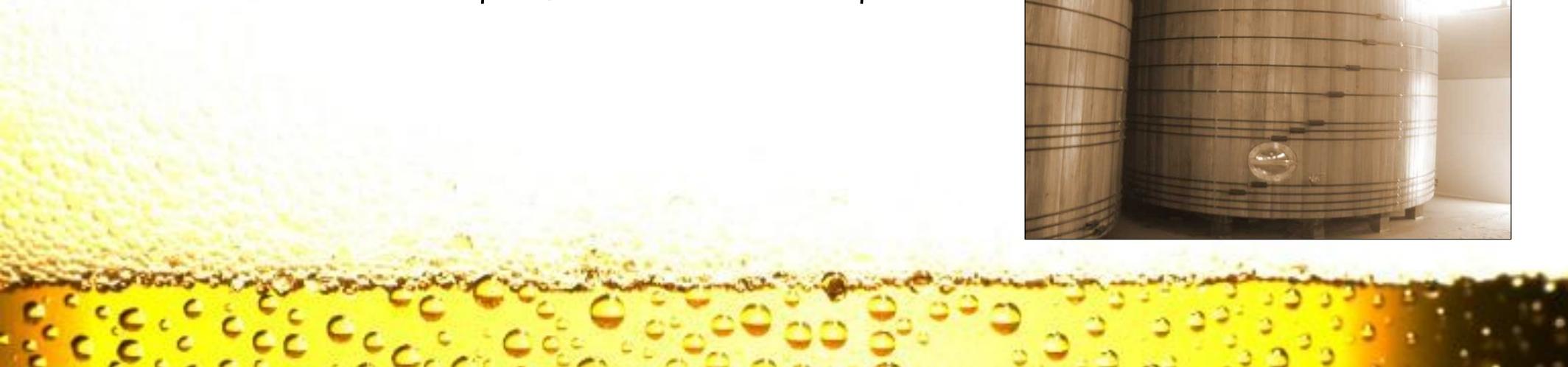
Size? 5 gallons to 2400hL (2045bbl)

Do you want wood character? How much?

How many uses? How old?

What's your budget?

Provenance costs \$... / Youth costs \$...



# Selection

## Barrel Considerations:

Bourbon are first use by law

First use doesn't mean more wood character

Wineries use barrels until they're neutral

Most whiskey barrels are exported for use in other spirits



# Selection

## Used wine barrels

225L (Burgundy) or 228L (Bordeaux)

Dried unless it's fortified

Gassed (SO<sub>2</sub>)

Used primarily for wine flavors and sours

## Used spirit Barrels

American Standard Barrel 53gal

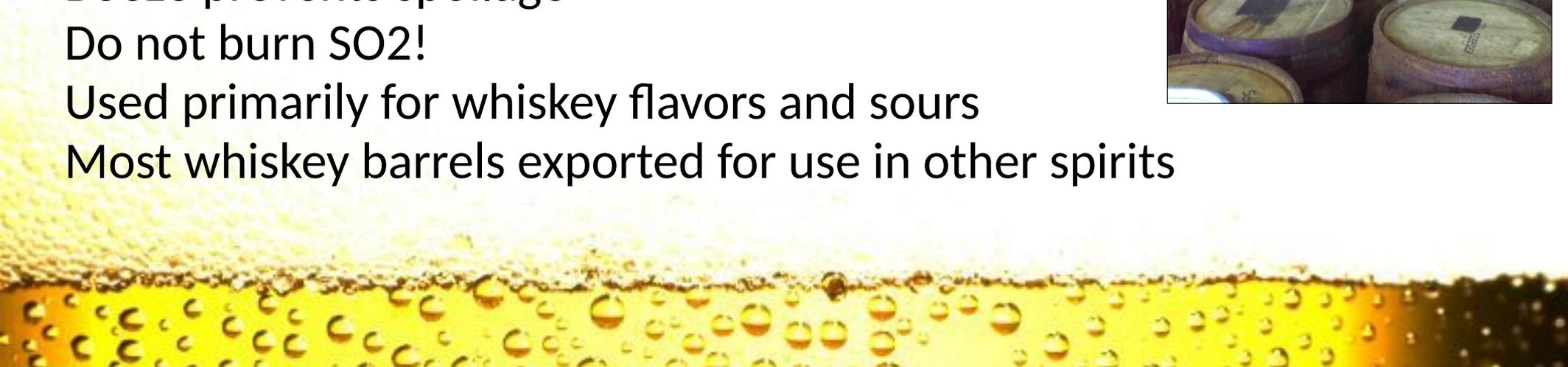
Sometimes wet

Booze prevents spoilage

Do not burn SO<sub>2</sub>!

Used primarily for whiskey flavors and sours

Most whiskey barrels exported for use in other spirits



# Sourcing

## New Barrel Considerations:

What kind of wood?

How many hoops? How many staves?

Stave thickness?

Toast level? (convection vs open flame)

Level of craftsmanship?

Bourbon barrels more automated (volume)



# Selection

## Why a foudre or cask?

COOL FACTOR! Slower ingress of oxygen

Progress more easily monitored than in smaller vessels

Smaller vessels can acidify before other flavors develop

Volume/labor

Communion with the wood

“Foudriers” are the aristocrats of the coopering trade



# WOOD TO WINE RATIOS OF COMMON BARREL TYPES

FEUILLETTE



PIÈCE / BARRIQUE



PUNCHEON



FOUDRE



## TOTAL BARREL SURFACE AREA

14 ft<sup>2</sup>

ROUGHLY THE SIZE OF  
A COFFEE TABLE

21 ft<sup>2</sup>

ROUGHLY THE SIZE OF  
A DINING TABLE

36 ft<sup>2</sup>

ROUGHLY THE SIZE OF  
AN AREA RUG

65 ft<sup>2</sup>

ROUGHLY THE SIZE OF  
A SMALL OFFICE

## WOOD TO WINE RATIO



68 in<sup>3</sup> WOOD  
PER GALLON OF WINE

ROUGHLY THE SIZE OF A  
MAGAZINE



51 in<sup>3</sup> WOOD  
PER GALLON OF WINE

ROUGHLY THE SIZE OF A  
KEYBOARD



39 in<sup>3</sup> WOOD  
PER GALLON OF WINE

ROUGHLY THE SIZE OF A  
FRAMED PHOTO

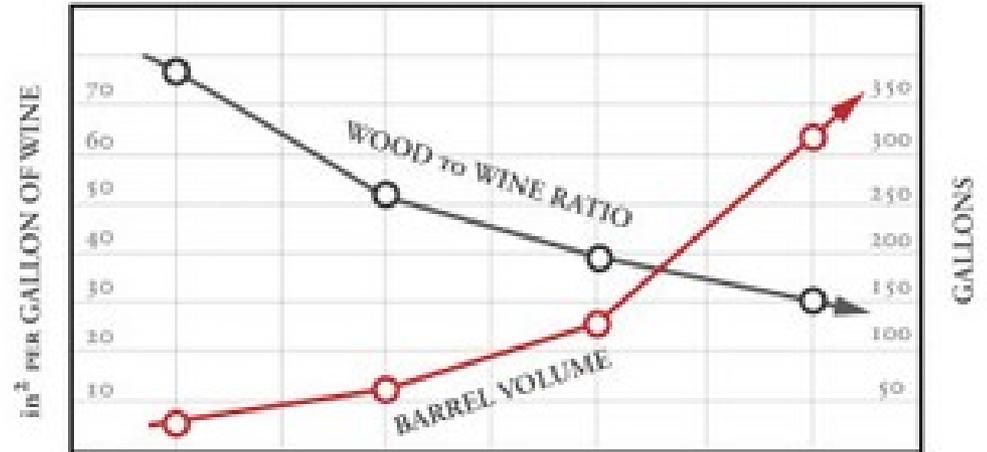


30 in<sup>3</sup> WOOD  
PER GALLON OF WINE

ROUGHLY THE SIZE OF AN  
ENVELOPE

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[www.pisonivineyards.com](http://www.pisonivineyards.com)

**Foudre Pioneer:  
New Glarus Brewing Company  
1994**



# New vs Used



# New vs. Used

## Benefits of new vessels:

- Always available in any size
- Clean slate
- Choice of size / choice of dimensions
- Choice of wood
- Choice of accessories/options
- Choice of toast level
- Choice of steam/vapor treatment
- Life expectancy
- Virgin wood – oak goodness
- More micro-oxygenation?



# New vs. Used

## Benefits of used vessels:

COOL FACTOR!

Usually a story to tell

Sometimes cheaper (not always)

Flavor contribution from previous contents

Less aggressive wood flavor contribution

If you're dealing with a cooper:

- Some customization possible

- Can be shaved, retoasted

Less micro-oxygenation?



# New vs. Used



## Oak alternatives

Inserstave

Staves

Mini Staves

Zig-Zags

Chips, Cubes, Rice, Powder





**110 year old  
Balsamic Barrel**



# Accessories/Options



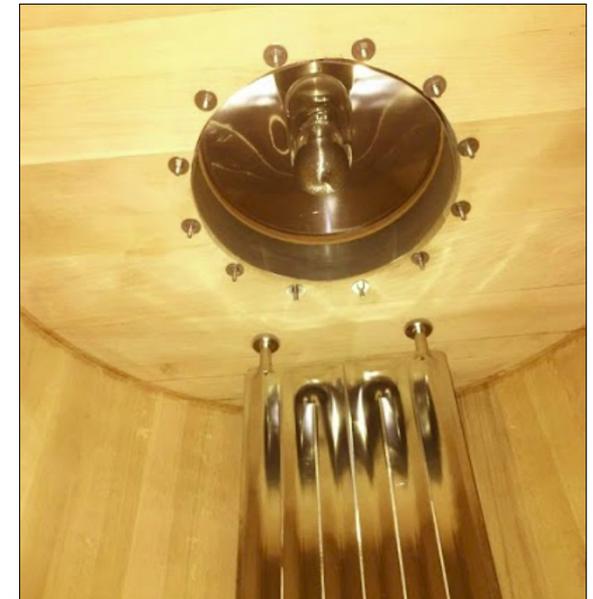
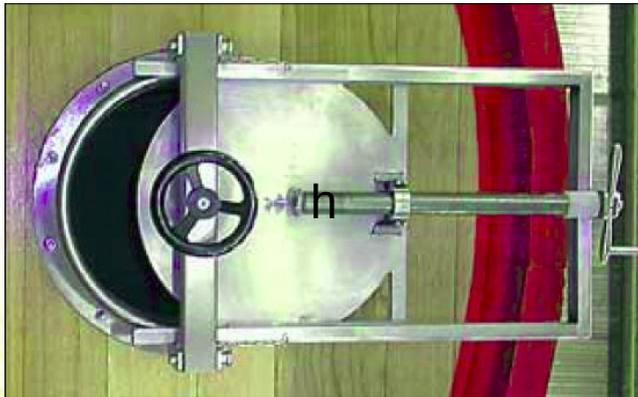
# Accessories

TC Ports/Valves (Garolla)  
Full Drain Port/Valve  
Partial Drain Port/Valve  
Front Manway  
Top Manway  
Blow Off Tube  
Thermowell  
Sample Tap



# Accessories

“Guillotine”-style Fruit Dump  
Cooling Plates/Coils  
Racking Arm  
CIP (Spray Ball)  
Tension Bands



# Accessories

## Manways

Top and bottom available

Do you really need one?

Resetting wooden manways can be challenging

Get stainless if you want to use it at all regularly

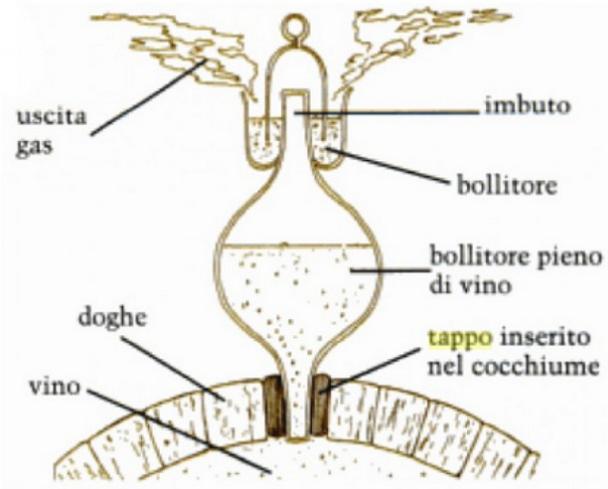
TC ports are often built into manway doors on European vessels

Top manways can be outfitted with TC ports for CIP



# Accessories

## Colmatores/Airlocks



# Sourcing Supply Chain Availability



# Sourcing casks & foudres

Small quantities/sizes are usually easy to import

2 – 3 month lead time

Consolidated containers with  
other orders

For larger orders:

How large are the vessels?

Can it/they fit in a container?

Anything over 100bbl (approx) – build on site

On site assembly considerations:

Airfare, rental car, hotel, food, labor,  
freight (tools, materials), project manager



# Sourcing



# Sourcing

## Considerations:

Plan in advance (lead times can be 3+ months)

Know your supplier

- Inexperienced entries to the market

Ask for what you want

- Custom stillage, accessories, etc.

## Unforeseen circumstances:

Weather

Politics (Exchange rates)

Shipping

Ferragosto!



# Wood Care & Maintenance



# Inspection

Physical inspection: scuffs, scrapes, dents

Is the bung covered?

Tape, Dixie cup, wood bung, silicone bung, cloth swatch

Cracks

Where are they?

End of stave? Near bung?

Head bulging?

Hoops dropping?

Head hoop sit flush?

Rivets in single line?

Spaces between staves?

Beetle/bore bug activity? Sawdust?

How does it “sound”?



# Inspection

Open it up

Smell - Be careful! Sulfur...

No mold or off aroma

“VA” = volatile acidity = vinegar taint = acetic acid

Take a look (flashlight and dentist mirror)

Liquid? What is it?

Tartrate crystals?

Inserts?



# Maintenance

## LEAKS? Don't panic...

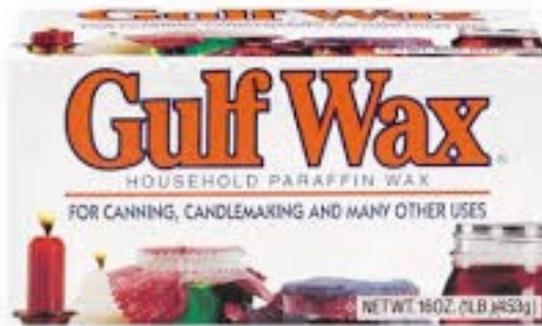
Barrel Sealer/Barrel Wax – paraffin, bees wax, petroleum

Paraffin wax – grocery store

Golf tees, toothpicks, spiles, wedges

Aquarium/food grade caulk

Homemade remedies – distilled water, flour, chalk/calcium carbonate, garlic



# Maintenance

## Tools of the Trade

Bung Puller

Hoop Driver

Flagging Tool



# Maintenance

**WESTERN SQUARE**  
INDUSTRIES



**Western Square Barrel Washing Station**  
Complete with washer wand and spray ball...\$1150



# Maintenance

## Wood Storage

Best way to store a barrel: FULL.

Wine has sulfites – prevents growth

Long term storage – dry

Drain rinse air dry (fan)

Sulfur burn

Plastic wrap?

Long term storage - wet

Potassium Metabisulfite (prevents mold growth)

Citric acid (balances pH)

Strips oak flavor

Less protective over time



# Maintenance

## BARREL OxyFresh

Wine Barrel Cleaner, Destainer, and Sweetener

### Why Use Barrel OxyFresh?

- Ensures removal of organic materials that may have accumulated during storage
- Helps to refresh and open the wood of older barrels
- Will bring a spoiled barrel back into service  
(\*Depending upon the degree of spoilage a final sulfur treatment may also be necessary)
- Removes unsightly stains
- Utilizes active oxygen to destain and disrupt organic soils
- Readily biodegradable and non-toxic

### What is Barrel OxyFresh?

Barrel OxyFresh is a cleaning compound designed specifically to provide maximum efficacy in removing organic soils and destaining wood in wine barrels while minimizing potential residues. Barrel OxyFresh incorporates oxygen as the primary active ingredient to produce an aggressive, yet natural, solution to break down soils and molds and condition the barrel so that it continues to add character to the wine. As a bonus, the oxygen content provides an additional benefit by lowering the oxygen demand of the wastewater.

Barrel OxyFresh's components will readily biodegrade or revert to naturally occurring minerals over a short period of time and the product itself is non-hazardous and non-corrosive.



ecologiccleansers.com  
608-658-2866 info@ecologiccleansers.com

## Barrel OxyFresh

Removes organic soils

Destains wood

Oxygen is the primary active ingredient

Aggressive, natural solution

Readily biodegradable

Barrel OxyFresh

# Maintenance

## Cellar Conditions

Wood is hydroscopic

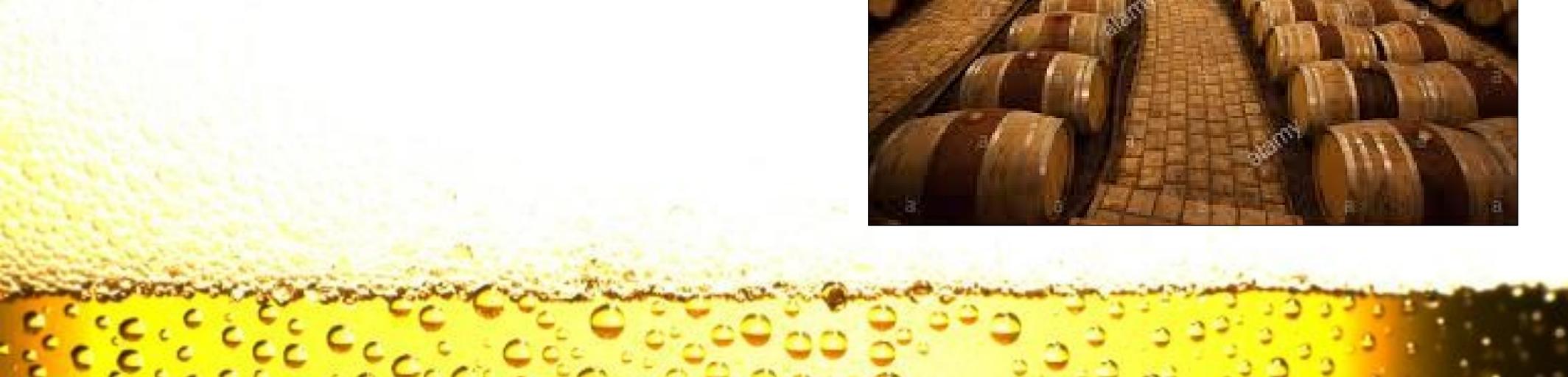
Balances it's moisture content with it's surroundings

Recommended Cellar Humidity: 72%-85%

Ventilation: one volume exchange per day

Fresh cut wood: 65%-80%

Barrels upon delivery (new): 16%





## **F.lli Romualdi Mastri Bottai SRL**

4<sup>th</sup> generation, family-owned cooperage

Established in 1883

All wood hand-selected by Master Cooper Enrico Romualdi

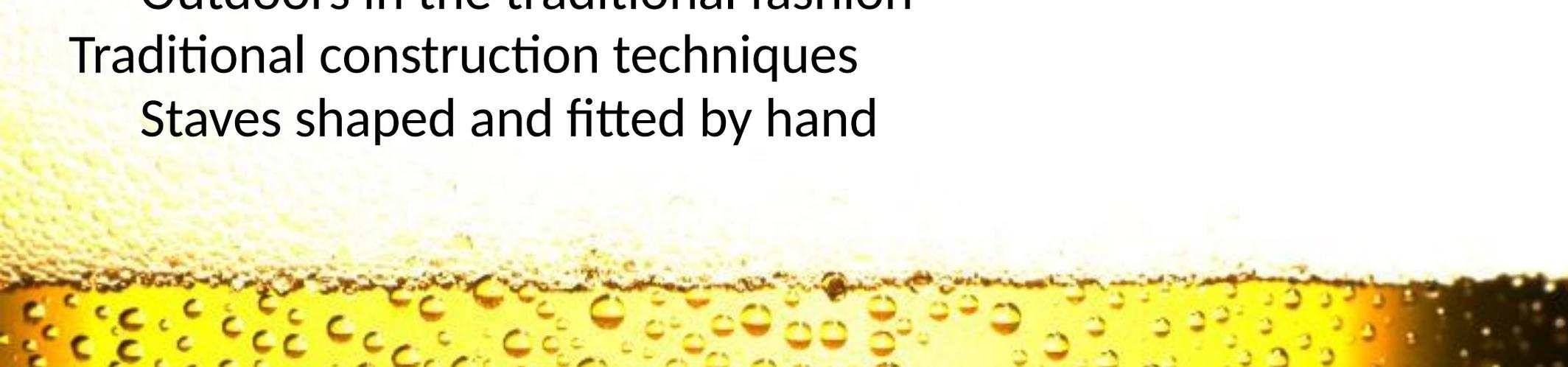
Only the finest French and Slovenian Oak

All wood seasoned a minimum of 60 months

Outdoors in the traditional fashion

Traditional construction techniques

Staves shaped and fitted by hand



**Hermit Thrush Brewing  
Brattleboro, VT**





## Off Color Brewing Chicago, IL



# Jack's Abby Craft Lagers Framingham. MA

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**ANXO Cidery**  
**Washington, DC**





**Rivertown Brewery &  
Barrel House  
Cincinnati, OH**



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