



PRESERVING OAK BARRELS

By Mike Recknor

NEW RELEASE

1999

MAPLE RANCH
PINOT NOIR

Varietal

100% Pinot Noir
5% Dijon (113, 115,
10-18)
64% Wadensvil clone
31% Pommard clone
100% Estate, Maple
Ranch

Harvest Data

Picked
October 15-25, 1999
24.3 Average Brix
7.1 Average g/L TA
3.54 Average pH

Barrel Aging

100% French Oak
20% New Barrels
Aged 10 months

Bottling Data

13.9% Alcohol
3.80 pH
Bottled Sept.2000

Production

585 cases
UNFILTERED

Oak barrels have two qualities essential to winemaking:

- Oak barrels breathe, which allows the tannins in red wine to polymerize,
- Oak barrels interact with wine as it ages to produce a range of effects in taste, including the “oak” flavor itself.

“Breathing”. The staves and head boards of an oak barrel are assembled without adhesive or caulking. When new, and dry, the seams are open and the barrel leaks. When wet, the wood fiber absorbs liquid and swells, pushing the staves and boards against the hoops, and against each other, with enough force to exclude the passage of liquid molecules. Smaller gas molecules will still find their way through, which allows us to say that the barrel “breathes”.

“Oakiness”. While breathing is a matter of physics, the interaction of wine and oak is a complex process of organic chemistry. The inside surface of a new oak barrel gives flavor to wine so rapidly that most wineries,

including Foris, age most of each release in used barrels to prevent “over-oaking”. Normally, no more than 10% of the barrels in use at any one time are new. Only French oak is used at Foris to produce its particular style of wine.

The need for maintenance. Foris keeps 1200 barrels in inventory at its current level of production. Most wine spends just a year in the barrel, so at least 900 barrels must be maintained annually, that is, drained, cleaned, decontaminated, repaired and made ready for service.

Barrel maintenance at Foris includes solving three problems:

- 1) bacterial contamination,
- 2) leaks caused by twig-borers, and
- 3) leakage through the cell structure of the staves caused by cross-grain cuts at the cooperage.

Bacterial Contamination

Wine grapes contain cream of tartar (KHC₄H₄O₆), a white crystalline salt with a pleasant acid taste that is deposited on the inside surface of the barrel as the

Cover photo by Leroy Clouser.
Maple Ranch as seen from an
Ultra-lite.

wine ages. The deposit is actually a combination of cream of tartar and other organic substances, and is referred to simply as “tartar”.

Bacteria may grow beneath the tartar if the barrel is not cleaned when it is emptied. Because it is acidic and alcoholic, no human pathogen can live in wine, but bacterial contamination could ruin its taste and therefore its value. With so many barrels in re-use every year, Foris has had to learn to clean them in a way that is not only effective, but efficient.

Cleaning with Hot Water. Barrels were first cleaned at Foris using hot water. Each barrel was allowed to sit full of water at 170F (77C) for about 15 minutes. 3 barrels per hour were cleaned, including the time to fill, empty and move them.

The Advent of Steam. Greater efficiency was needed as production grew and the number of barrels increased. Several years ago, Ted noticed an ad in a trade magazine for a steam wand for barrel cleaning. The wand is essentially a closed-end

brass tube with transverse holes, and a fitting at the other end to couple to a high temperature hose. The wand is inserted into the bung hole. Rigging a steam generator from a stainless steel tank and a propane burner, Foris entered the steam age in barrel maintenance.

Steam offers significant advantages over water. The barrel must be filled with water to make complete contact over the inside

surface to melt the tartar. 60 gallons is a lot of water, which takes time (and fuel) to heat.

Steam, on the other hand, is a gas, and so a little of it will expand to touch all of the inside barrel surface. Furthermore, it delivers more energy to the tartar in a shorter time than hot water. Steam contains 540 cal/gram (970 BTU/lbm) of energy, called the heat of vaporization, that is required to change water from a liquid to a gas. As the steam touches,

*Geoff Sullivan—
the advent of steam.*



*Perserving Oak Barrels
continues on the next page.*

BARREL MAINTENENCE continues

it condenses to liquid and transfers its vaporization energy, melting the tartar. This also explains why steam is more dangerous to touch than hot water – steam transfers much more energy almost instantaneously as it condenses on the skin.

The Foris steam team determined that they

A porcupine barrel at Foris.



could clean a barrel in just a few minutes using the properties of steam. In fact, two people working together can clean a barrel every 5 minutes, or about 100 per day.

Twig – Borers

There are many species of twig-borer across the United States. The twig-borer is an insect shaped like a narrow cylinder

that bores into wood to lay its eggs. Twig-borers in California and Oregon find the oak in wine barrels very attractive, and will bore through the thickness of a stave or end board overnight, creating a leak if the barrel is full.

No toxin is produced during this process, so the wine is not contaminated. However, if the resulting leakage is undetected the wine will be damaged by excessive exposure to oxygen. A barrel attacked by twig-borers might lose 20 gallons of wine in 2 or 3 days. Fortunately, an attack by a twig-borer is readily visible, both by the small pile of sawdust by the hole, and later by the red stain of wine.

Prevention: The best way to control twig-borers is to keep them away from the barrels in the first place. Twig-borers fly, so the fundamental policy at Foris is to “Keep the winery doors closed, and the barrels indoors overnight, from April through August!” when twig-borers are active.

Corrective Action: If, in spite of everyone’s best efforts, a few twig-borers make it to a barrel all is not

lost. The accompanying illustration shows a barrel being repaired with oak “spiles” that are sharpened in a pencil sharpener, then driven into the hole bored by the insect after its carcass has been pried out with a piece of wire (like a paperclip). This is time consuming, but it is worth it to save 60 gallons of wine.

Just how serious a threat the twig-borer can be was driven home last year. After many years of successful control of this problem by excluding them from the winery, a few barrels were left outside overnight then brought into the winery by a new employee. Within days, evidence of twig-borer infestation began to appear, calling for a near frenzy of inspection and plugging. In all, over 100 barrels were attacked over the next 4 months! This problem will not tolerate complacency or carelessness.

Chime Leaks

French oak is hand split to form the curved staves of the body of the barrel. Despite the care with which this is done, occasionally a stave will be assembled into a barrel that

has “cross-grain cuts”. In this case, the long cells that form the wood are aligned parallel to the stave, and act as liquid conduits. It is as if the stave were fitted with capillary tubes running from midway to the end or “chime”, where the stave meets the head.

This defect is undetectable until the barrel is full, when a red stain at the chime region betrays its presence. About 3-4% of barrels from even the most reputable coopers have this problem in a stave or two. As with so much else in life, early detection is the key to remedy. The leak must be plugged and the barrel refilled before the wine is damaged by exposure to air.

Plugging a small leak. A small chime leak is stopped using a paste of common blackboard chalk and garlic. Applied with a fingertip, it seals immediately, and the taste of garlic has never been noticed in the wine.

Plugging a large leak. Small leaks are stopped with the paste, but larger leaks require a more modern technology – food grade epoxy. In addition to cross-grain cuts, large leaks

may have other causes, such as a stave shifted from its proper position when the barrel is dry. Whatever the cause, the barrel must be emptied before the epoxy is applied, then allowed to cure. This is obviously more time consuming than dabbing a hole with paste, but it happens much less frequently.

Chime leaks are more than a nuisance. A trial purchase of low-cost barrels from an eastern European supplier a few years ago turned into a disaster when the barrels were filled. The barrels had so many cross-grain cuts and distorted staves that they were unusable. 