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Feature Article from the August 2008 Magazine Issue

NATURAL CORK'S REBIRTH

Slowly but steadily, TCA comes under control

by [Tim Patterson](#)



Strips of cork are fed into a cork-punching machine, with the grain running across the cork.

PHOTOS: APCOR, The Portugese Cork Association

Natural cork is the Merlot of the closures market. After a decade of bad press, it's still doing a brisk business. While Merlot got beat up in *that* movie, cork takes some hits in a recent book, George Taber's *To Cork or Not to Cork*. And both products still have some work to do before they are, so to speak, out of the woods.

The link between corks and the spoilage agent TCA was established in the early 1980s. Formal and informal studies a few years later found that anywhere from 3% to 7% of commercial wines showed evidence of cork taint. Producers of natural, oak-bark cork have been on the defensive ever since, especially in the early years, when a faulty cork was thought--erroneously, it turned out--to be the only way TCA could get into a bottle. An entire industry of synthetic corks rose up to challenge the old standard; more recently, all the buzz has been about screwcaps, glass caps, Zorks and a variety of other alternatives.

Natural cork still dominates the market. But is it any

HIGHLIGHTS

- Natural cork closures have taken a beating for several years over the issue of TCA, though natural cork still remains the dominant choice for premium wines.
- After a slow, grudging start, the major cork companies embarked on a long-term effort to overhaul their production processes, step by incremental step.
- Cork is a natural product, so the defect rate will never be zero, and possibility of reinfection is always a

better, any less risky than it was a decade ago? For sure, the major cork suppliers have invested plenty of time and money in new technology and process improvement. There are some indications that the overhaul of the industry is yielding results--though the pattern is uneven, not uniform. And there's still the nagging, underlying reality that, as a natural product, bark cork will never have a zero failure rate.

danger.

- While exact measurements of progress are hard to come by, the trend in natural cork quality seems clearly to be positive.

Slow start on remediation

TCA (2-4-6 trichloroanisole) was identified as the culpable compound in many stinky wines by a Swiss chemist in 1982, and soon it was traced back to cork stoppers. The cork industry in Portugal and elsewhere initially tried to ignore the inconvenient truth, arguing that making the link public was libelous. Cork producers took refuge in the monopoly their product enjoyed--there was no other stopper in sight for fine wines, and anyway, most wine drinkers had no knowledge of the problem's source.

Portugal's membership in the EU and an increase in investment started to make a difference. More importantly, the arrival of the first synthetic cork in 1989 and the rapid growth of synthetics in the following years eventually got the natural cork crowd's attention.

Another spur for process improvement was the development of relatively simple, reliable testing methods. First developed at the University of California, Davis, and then commercialized in cooperation with Napa's ETS Laboratories, the combination of gas chromatography and mass spectrometry (GC-MS), utilizing solid-phase micro-extraction (SPME) to collect samples, has become an industry standard, able to detect lower and lower levels of TCA and related compounds and precursors.

The testing technique, combined with statistical sampling methods, was popularized in the industry by the Cork Quality Council. The CQC was formed in 1991 as an alliance of seven cork producers concerned with both marketing and improvement in quality assurance. CQC encouraged ETS to work on the testing system and, in 1999, began to promote it within a large segment--today probably more than three-quarters--of the industry.

Council implements testing program

What GC-MS testing replaced was simple sensory analysis, which had relied on the notoriously uneven capacities of different people to sniff out trouble. The new, more objective, more sensitive technology allowed for testing at every step along the way in the cork production process, for weeding out bad lots early on, and for pinpointing where in the chain of production a problem of contamination might be occurring.

Incremental process improvements

What has followed, accelerating since 2000, is a long string of small, incremental steps in process improvement--no single one a silver bullet, but taken together, enough change to amount to a dramatic overhaul. Having control of cork at every step from forest to bottle is essential, and good work done at one stage in production could easily be undone by a slip-up later on.

Starting in the cork oak (*Quercus suber*) forest, the lowest portions of the tree bark, closest to the soil, no longer are harvested, or they are discarded, since they are most likely to contain contaminants. The old practice was to cure the sheets of cork right in the forest, piled on the



Loggers strip the outer bark from a cork oak while harvesting cork in Portugal. The Cork Quality Council says the occurrence of TCA in corks from Portugal has fallen 80% in the past five years.

dirt. Now, producers take sheet cork to their own facilities and stack it on inert materials in much cleaner environments. As Neil Foster of M.A. Silva Corks USA puts it, "Starting with good raw material, rather than trying to fix it, is the key to quality improvement."

Perhaps the weakest link in the old methods came with how the bark sheets were boiled--the first step in cleaning the cork. Some producers used chlorine in this process, because of its sanitizing powers. In fact, the chlorine provided an abundance of precursors for later TCA formation. Open-tank technology made it hard to control temperature and ensure the cleanliness of the water.

Cork boiling today is more likely to happen in a closed system, with precise temperature control, utilizing water that is constantly recirculated and purified through filtration or degasification. The chances that contamination will spread from one piece of cork to an entire tankful are greatly reduced. Drying is quicker and handling reduced.

After the individual corks are punched and graded, they need to be washed. New methods in this area tend to rely more on steam than hot water, helping to volatilize or kill contaminants. Chlorine was part of the mix in the past, but no longer; today it's more likely to be ozone, hydrogen peroxide or ethanol.

Raul Marques of Juvenal Direct explains his company's twist, sending washed corks through tunnels where they are exposed to microwaves, "cooking" the excess moisture and unwanted compounds from the inside, much in the way a home microwave reheats leftover pasta.

All these processes can come to naught through re-infection during transit or storage. Several years back, Juvenal, among others, began inspecting the containers used to ship its corks from Portugal. All the producers monitor the temperature and humidity in their warehouses. When M.A. Silva moved into a new Northern California facility, the company had ETS screen every aspect of it, and installed systems for purifying both water and air.

In addition to revamping the technology, cork producers have tweaked administrative and management practices. Many have received ISO certification for various processes and can claim compliance with the Code of Practices of the European Cork Federation. The cork suppliers have a lot to show for their efforts in the past decade.



Sheets of cork are no longer dried on the forest floor.

Mixed reviews on progress

It's not easy to come up with a single, overall metric to capture how much progress has been made in controlling TCA and improving cork quality. Daryl Eklund, general manager of Amorim Cork America, puts it succinctly: "I think everyone would say we've contained the problem, not defeated it."

Peter Weber of the CQC, which has overseen testing of hundreds of thousands of corks, says they found a more than 80% reduction in TCA in shipments arriving from Portugal during the last five years.

Christian Butzke, who teaches enology at Purdue University and has spent years tracking the TCA issue, says he approaches the question of progress from four different angles. His starting point is that if the industry can reduce the incidence of cork taint to 1%, one bottle out of a hundred, that is a victory--a core wine drinker might come across two bad corks a year--a number low enough to live with.

His first vantage point is the issue of testing. When he taught at UC Davis some years back, Butzke and his graduate students were involved in the introduction of the GC-MS techniques, and he thinks that analytical and sampling methodology has been quite successful in documenting where problems exist. Second, as winemaker at [Sakonnet Vineyards](#) in Rhode Island for several years, he was able to develop relationships with good producers and had good results in cork quality. More recently, from his third perspective as the chief organizer for the Indianapolis International Wine Competition, the incidence of cork taint has been surprisingly low.

And finally, as a consumer, he's not so sure. Our conversation started with him grumbling about an expensive Priorat he had hand-carried back from Spain, only to find it corked. It didn't sound like that was the only bad bottle he'd had this year, either. He wonders where all the bad corks identified during production end up. Do they simply find their way into other channels, sold at a discount?

The overall trend is clearly toward higher cork quality. With renewed confidence in their products, some cork suppliers are trying to move beyond TCA statistics, emphasizing the environmental advantages of a renewable resource from trees that actually reduce the amount of carbon dioxide in the atmosphere. They stress natural cork's centuries-long track record in allowing the gentle oxidation that lets fine wines age gracefully.

What seemed like an either/or battle a few years ago--stick with natural cork or switch to alternatives--now looks more like a permanent segmentation of the market, at least in the U.S.

White wines, early-drinking reds, and mass-market bottles are gravitating toward alternative closures; ultra-premium and potentially ageable wines are sticking with natural cork. Not surprisingly, many of the U.S. distributors of natural corks also sell synthetics and screwcaps.

In many quarters, natural cork still lives in the shadow of all the bad press. But it's fair to say that cork is back, able to engage in a fair market fight with the alternatives.

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Council implements testing program

The Cork Quality Council (CQC), an association of seven major companies that import natural cork into the United States, has overseen for several years what is undoubtedly the largest systematic effort to test for taint in corks.

Since 2002, member companies have been performing cork soaks on a portion of the bales (roughly 3 out of 10) in every incoming shipment of corks. Each soak--all done in wine--is performed on a sample of 50 corks, and the wine then is sent to ETS Laboratories in St. Helena, Calif., for analysis on GCMS machinery owned by CQC. Results then are sent back to the cork companies and to the CQC for its statistical records. Currently, ETS/CQC look at 24,000 samples--or 1.2 million corks--per year. Measured another way, CQC members go through 3,200 cases of wine doing the soaks.

The CQC's research indicates that the average human sensory threshold for TCA taint is 6 parts per trillion (ppt); the testing program flags anything 1ppt or above. If a batch fails testing, further sampling is done on more bales from the same lot, and if one of the new samples again has a TCA level of 1ppt or more, the entire lot is rejected and not put into inventory. The CQC audits the activities of its members to ensure that proper methods are observed.

Overall testing results show substantial improvement in the quality of incoming shipments in the past five years. The table at right shows aggregate results for testing done in the second quarter of each year. The blue portion of the column represents tests showing less than the minimum detection level (MDL) of 1ppt; the red portion represents tests showing 1-2ppt; levels above 2ppt are not shown. In 2003, 45% of bales tested below the MDL; in 2008, 80% did.

For more information on the Cork Quality Council, its methodologies and its member companies, see corkqc.com.

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