Corks and Closures in the United States: Issues and Challenges

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Introduction
The following four comments are provided in an attempt to summarise the attitude of American users of corks and other closures:

• I will never use anything except natural corks for my wine. It would be a disaster.
• I hate corks. I will never use them again. They have ruined their last bottle of my wine.
• Right now corks are the best solution, but I will continue to look at every possible option because I want the best possible closure for my wine.
• The problem with corks is simple. We just have to eliminate the variables.

Formation of the Cork Quality Council (CQC)
The Cork Quality Council of California was formed in 1992 as an educational organization to promote better understanding of wine corks and their correct use in the winery. However, five years of endeavour and dedication preceded that formation.

At that time, a number of Californian cork suppliers were aware of significant problems with corks and how they were used. Occasionally, two or three would meet informally to discuss the problems they encountered in the market. They identified the following problems:

1. The wine media had suddenly noticed that "corkiness was a problem. When confronted with the question, Californian winemakers pointed the finger directly at cork suppliers. Cork taint was quickly becoming the topic of the day in the Californian wine industry.
2. The suppliers' concern was complicated by the fact that many wineries in California knew very little about corks, even less about how to use them and, consequently, blamed every case of bottle variation on the cork.
3. While these suppliers attempted to discuss the issue with their European producers, they often found that language, cultural differences, and ignorance of the American market led the European producers to take a less than completely responsive approach.

Early in 1992, after struggling for years individually, five of the companies agreed to work together to solve the problems they faced as an industry. They conceived the CQC. By the time that the organisation was formed, there were seven founding members: Cork Supply International, Lafitte Cork and Capsule, Scott Laboratories, Latchford Package (now Latchford/Saxco), Portocork, Cork Associates, and Ital-cork. These seven intensely competitive companies were brought together by the need to work together to fight a battle that was clearly bigger than any one company alone. Part of the formation of the CQC was the selection of Balzac Communications & Marketing as the agency to represent the CQC, and the author as the Executive Director, who has a background as a communications specialist and technical writer in the wine industry. The three years since have seen the role of Executive Director vary from that of peacemaker, building unity in the Council on key issues, to cattle prod, driving the group to address the major issues and forcing it to deal with the issues of most interest to the wine industry.

The CQC has three primary goals that are easy to describe, but challenging to accomplish. The first is to provide enough accurate, practical information to the Californian wine industry that every winery in the State will approach bottling their wine with the same care and expertise with which they approach the selection of their grapes and the blending of their barrel lots. The second is to work together as an organisation to improve the performance of cork suppliers in the United States, to develop effective and demanding industry standards, general inspections, and technical procedures. The third is to work with European producers to improve the quality and consistency of the corks they provide, and to guarantee that corks of high quality and consistency are delivered in California.

It has not been an easy task, and is far from complete. However, a number of achievements have been made. Recommended bottling procedures have been developed to help winemakers understand the issues involved in bottling wine, and how they can best resolve them. Incoming and outgoing quality control standards have been developed and instituted for all members of the CQC. These standards require the documentation and analysis that are expected of today's suppliers. Visual grading standards have been developed for corks, which help winemakers understand the issues involved in grading corks, and how they affect performance in the bottle and in the market. Finally, a series of wine industry seminars have been organised to convey this information to the relevant people, such as bottling line supervisors, winemakers, and purchasing managers.

Some problems remain unanswered. In some cases, the problem is difficult to define. However, the position of the CQC allowed the Council to become well known, which led to contacts with others pursuing similar goals. It was found that, by working together, the CQC held more information than anyone else in the United States, and was in a better position to learn more. The CQC was contacted by the coffee, chocolate, raisin, soft drink, beer and bottled water industries, which were also having problems with 2,4,6-trichloroanisole (TCA).

One of the most puzzling aspects was the recent increase in concern regarding TCA. In the last ten years, it seems as if it has become much more prevalent. The reasons why, and the factors which have changed in that time, have been formulated into a number of theories:

1. The Revolution in Portugal changed agricultural practices and affected the financial strength of the industry. These events may have led to short cuts in processing that created a better environment for the formation of TCA.

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2. The standard of winemaking improved greatly in that time, and it is possible that 'cleaner' wines show contamination by TCA or other spoilage characters more readily.

3. The reduced use of paraffin, combined with the increased use of silicone, might have affected the incidence of TCA taint. Paraffin might serve as a barrier to TCA and, now that less paraffin is used in wineries, the impact of this barrier effect might be reduced. This theory was proposed by Dr Ken Fugelsang, Professor of Microbiology in the Department of Viticulture and Enology at California State University, Fresno.

One of these theories was investigated. Research performed at individual wineries indicated that TCA can be formed in the bottle, and the incidence of such TCA taint can be tremendously reduced by the use of sulphur dioxide (SO₂) on the corks. Kay Bogart, at Glen Ellen Winery, began with a lot of 100 mouldy corks which had passed a sensory examination. Half of the corks were used to seal bottles of wine immediately, and the resulting incidence of TCA taint of the wine was nearly 75%. The other corks were sealed for 24 hours in a plastic bag containing SO₂ prior to bottling. In this instance, the incidence of TCA taint in the wine was 8%. This experiment indicated that the TCA was formed in the bottle, and that SO₂ killed the mould and reduced the incidence of taint. It is now a requirement that all corks received by members of the CQC have a moisture content below 8%, thus eliminating the potential for mould growth on the corks.

At the same time, variables which had the most impact on bottle-derived TCA taint (cork length, bottle direction, etc.) were investigated. Experiments in which corks were inoculated with mould were conducted. Some corks were treated with SO₂, some were irradiated, and some were left as a control. The results of the previous test comparing SO₂ and the control were expected. Irradiation was expected to destroy the mould spores, and virtually eliminate TCA formation. Bottles were stored either neck up or neck down. If the wine was exposed to mould due to seepage, then the bottles stored neck up should have had a lower incidence of TCA taint. Corks of 38 mm and 44 mm were used, with the expectation that the shorter corks, free from the effects of the outwardly tapering bottle necks, would show slightly less seepage, and lower incidence of TCA taint.

None of the assumptions were correct. There was no statistically significant difference between any of the different lots. However, Dr Fugelsang noted an important difference between the experiments. In the earlier experiment, the pH of the wine was 3.55, the concentration of free SO₂ was 28 mg/L, and TCA developed readily in the bottle. In the second experiment, the pH of the wine was 3.15 and the concentration of free SO₂ was 39 mg/L. In the opinion of Dr Fugelsang, the differences in acidity and concentration of molecular SO₂ were critical. Wines with a lower SO₂ concentration and higher pH are much more susceptible to bottle-derived TCA formation.

There has been a trend in the USA towards the use of a lower concentration of SO₂ at bottling. There is a corresponding trend to encourage malolactic fermentation in many more white wines, thereby raising the pH. In combination, these two trends may explain why TCA contamination is more common today.

Muller and Fugelsang (1994) have shown that a low concentration of SO₂ in wine can permit the combination of ethyl acetate with hydrogen sulphide to create a compound that is indistinguishable from a common cork spoilage character by sensory analysis. The evidence suggests that, in combination, the use of SO₂ on corks, correct bottling procedures, and correct cork processing to ensure a low moisture level in the cork, can greatly reduce the problem.

Sensory analysis was performed on old glass bottles. It was noted that these bottles, stored in cardboard boxes, can absorb identifiable spoilage aromas. Many wineries keep such bottles, ready to use, for ten years or more. According to Dr Monica Christoph, Director of the Institute at Geisenheim, surveys performed at Simi Winery showed that the bottling room had the second highest count of mould spores in the winery. Only the employee recreation room showed a higher population.

The CQC has new projects in development. The Council is working with Dr Fugelsang on a standardised quality control manual for wineries. The Glass Packaging Institute of America is being encouraged to press forward with the development of a truly cylindrical bottle neck for wine bottles. The University of California at Davis and the CQC are working together to develop more effective and practical quality control analysis methods for incoming corks, thereby allowing winemakers to have more confidence in the corks they use. Finally, the CQC is working with a major international pharmaceutical company to identify the exact moulds which cause TCA taint, and to develop a simple 'black box' test for those moulds for use by the wine industry. This company has a food grade product which, they believe, is effective in eliminating that mould, and eliminating the potential for TCA formation in the winery and in the bottle.

Despite these projects, there is potential for more work. Some wineries have been helped to drastically reduce the incidence of TCA taint in their wines. There is now a high number of wineries, with very effective quality control and bottling procedures, which can demonstrate that they have reduced the incidence of TCA in their wines to no more than 1%. It has not been eliminated, however. The single biggest question remaining to be solved is how TCA and other less notorious cork contamination can be completely eliminated. Most of the theories about the formation of TCA do not explain why it affects such a low percentage of corks. They make sense but, if they were true, 50% or more of the corks should be affected. This is not the case.

Finally, the reason why the alternatives to natural corks are gaining increasing attention should not be overlooked. This reason is the inability to completely eliminate cork spoilage characters.

Perceptions of the American cork market

There is no question that the American cork purchaser of today is more demanding, more knowledgeable, and more sensitive than ever before. In short, there are more discriminating buyers every day. While much has been done to educate some of these buyers, allowing them to make better decisions, and use better procedures, there are many buyers who have helped to develop these standards. In fact, a direct relationship between the size of a winery and the sophistication of their quality control procedures has been noted. In California, larger wineries have more extensive quality control departments, better procedures, and achieve better results. Many larger wineries have their own highly developed purchasing guidelines and quality control standards, which have been used for years, and which provide documented, acceptable results. Most small wineries lag behind these larger wineries, and tend to rely much more on the supplier for the quality and consistency of the products they purchase. Sometimes, the results are disastrous. This has led to some very visible and understand-
in corks, and can they be sealed within the cork by polymeric coatings?
2. Where is the site of the origin of taint compounds on a cork, and what mechanisms transport them through or around the cork?
3. What are the flavour effects of the various surface treatments used to coat corks?
4. What are the flavour effects of the various vases used to bleach and/or wash corks?
5. What causes taint? Is it an artefact of the cork preparation process, a modification of an artificially synthesised chemical that is ubiquitous in the cork forests of the world, or is it a natural chemical produced by the cork tree?

The aspect of performance most in need of research is the relationship between the physical characteristics of a cork (such as density and elasticity) and the various defects which

are used as grading criteria, and its sealing properties.

While there is no doubt that such research should be locally supported through bodies such as the Cooperative Research Centre for Viiculture, it is believed that the Australian industry must gain access to the substantial store of relevant information that is generated in Europe. Our track record in this area is not good, and so determined steps must be taken at the peak industry level to improve. A starting step, it is proposed, that the WFA becomes a member of CTCOR.

References


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ably frustrated critics of natural cork. Hence, it is pertinent to discuss some of the alternative closures in the United States.

Currently, the best known alternative to natural cork is a product called Cellukork, made by Lermer Packaging in New Jersey. Cellukorks have some very satisfied customers in California, most notably the St Francis Winery in Sonoma. These stoppers were tested at St Francis, where they are now used exclusively. Excellent sealing properties have been reported, with virtually no negative public reaction. It is stressed on the bottle that this cork cannot be removed with a two pronged cork puller. Those at the winery deserve a great deal of credit for the amount of promotional attention and publicity which has been generated via the Cellukorks.

Other wineries have had serious problems with Cellukorks. The August issue of Wine Business Monthly (1994) contained a very good discussion of the claims made by Cellukork, and the experience of the industry. Some of the difficulties with these stoppers may be a function of the size and type of bottling line used. Larger wineries note far more problems, especially that these stoppers are far more sensitive to minor adjustments and alterations to the bottling line than natural corks. To date, none of the large producers have adopted Cellukork closures for large volumes, although extensive experiments have been conducted at almost all of these wineries.

There are probably two reasons for this lack of acceptance. The first is that these stoppers do not offer the same performance as natural cork stoppers, as noted in the Wine Business Monthly article. The other is that large wineries have access to more sophisticated market research, which may indicate consumer resistance. While those at St Francis Winery claim to have had no negative public response, Dry Creek Cellars recently bottled Chenin Blanc wine with these stoppers, and reported that 75% of the comments received were negative.

Ironically, the one closure which has always been identified with negative public perceptions is the screw cap. One winery in California has taken a major step with these closures in the last year. Sutter Home Winery introduced the Vinloc closure for a series of 1.5 L varietal wines that were targeted for the on-premises market. A cording to Sutter Home, there has been virtually no comment, positive or negative, concerning these closures. This lack of comment may be due to the on-premises focus of the marketing effort. The Vinloc closure is described as ideal for the on-premises trade in that it is easy to open and close often, and these wines are not intended for storage for more than three to six months. After initial problems with a brand new bottling line, Sutter Home reports that on-premises sales are strong. The winery will introduce the product to off-premises sales in the near future, and may get more consumer feedback at that point. It must be noted that natural cork closures continue to be used for the vast majority of varietal wines at the Sutter Home Winery.

Market response to closures

The response to the various closures in the United States market is summarised below. Clearly, screw caps are perceived as a cheap closure for cheap wine. Although the Sutter Home Winery developed a major publicity campaign to encourage writers and the public to see their Vinloc closure as something else entirely, the predominant responses to that campaign were comments regarding the appearance of the closure, noted as being typical of a screw cap.

The response of the public to plastic stoppers is still unclear. While those at St Francis Winery report great success, others are equally sure that the public does not like these closures, perceiving them as lesser imitations of natural cork stoppers. There is now considerable discussion concerning natural cork closures, primarily relating to cork taint, but also touching on leakage and the long standing debate about a more user-friendly closure for an intimidating product. The best evidence for the superiority of natural corks in the market place is the continued support they receive from major wine marketers such as Gallo, Sebastiani, Canandaigua, Robert Mondavi and Seagrams.

Summary

The closure market in the United States is in transition. The current champion, natural cork, has a number of advantages. In most bottles, it makes a superior seal and is easier to use than alternatives, and has a long positive track record and an excellent public image. These advantages are under attack from alternative closures. As the alternatives get better, it is incumbent upon the cork industry to match those improvements with improvements of their own. The role of the QC, and its Executive Director, is to make sure that natural cork producers and suppliers continue to devote the time and resources to make that happen.

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4. What are the flavour effects of the various washes used to bleach and/or wash corks?
and lastly and most significantly:
5. What causes taint? Is it an artefact of the cork preparation process, a modification of an artificially synthesised chemical that is ubiquitous in the cork forests of the world, or is it a natural chemical produced by the cork tree?
The aspect of performance most in need of research is the relationship between the physical characteristics of a cork (such as density and elasticity) and the various defects which are used as grading criteria, and its sealing properties.
While there is no doubt that such research should be locally supported through bodies such as the Cooperative Research Centre for Viticulture, it is believed that the Australian industry must gain access to the substantial store of relevant information that is generated in Europe. Our track record in this area is not good, and so determined steps must be taken at the peak industry level to improve. A satisfactory step, it is proposed that the WFA becomes a member of CTCOR.

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