

GRAIN OF TRUTH

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BY THE END OF THE 1990S, SABATÉ'S ALTEC CLOSURE WAS WIDELY CRITICISED FOR UNACCEPTABLE LEVELS OF TAINT. AFTER MODIFICATIONS, THE FRENCH MANUFACTURER INVITED EXPERTS FROM THE TRADE AND PRESS TO TEST THE PERFORMANCE OF ITS OLD AND NEW CLOSURES. JAMIE GOODE ANALYSES THE RESEARCH MODEL'S OPENNESS, METHODOLOGY AND ITS SURPRISING RESULTS.

NEVER BEGIN WITH AN APOLOGY. This is one piece of advice that budding writers and public speakers would do well to adhere to, but I'm going to disregard it this time. In fact, I'll start with two. First, I apologise for the fact that this is yet another piece of cork taint. It continues to be one of the most important and divisive issues facing the wine trade, albeit one of which many have prematurely grown weary. My second apology concerns the necessarily technical nature of some of the issues discussed here. However, this article represents the first public airing of some extremely important data from a rigorously conducted research study, shedding light not only on the performance of a particular closure type, but also on the nature of human perception of the cork taint culprit, 2,4,6 trichloroanisole (TCA).

The study in question was commissioned by French company Sabaté, the world's second largest closure manufacturer. As well as conventional corks, Sabaté's portfolio includes Altec, a manufactured and standardised cork-based closure. Launched in 1995, Altec represented a novel approach to alternative closures. The problem it addressed was the dissatisfaction of wine producers with the performance of the inexpensive corks that they were using for their mass-market wines. Because of perceived consumer resistance to plastic corks and screwcaps – the opposition is particularly strong in the French market – Sabaté devised what is, in effect, a hybrid closure: part cork, part synthetic, but which looks like a natural product.

This process involves taking raw cork and fragmenting it into tiny particles. These are then sorted and most of the lignin – the hard, woody material that surrounds the lenticels (the tiny pores in the cork) – is discarded. This cork 'flour' is then blended with proprietary polymer microspheres and the whole lot

stuck together with a binding agent. The resulting closures are consistent, and in theory should have lower risk of TCA taint than normal corks because the lignin-rich material that surrounds the lenticels is considered to harbour the majority of the TCA contamination.

Initially, Altec was tremendously successful. Sales were huge: to date, Altec has sealed more than two billion bottles of wine. But a couple of years ago, reports began to circulate that Altec, which had initially been marketed as taint free, was causing unacceptably high level of taint. The situation was particularly bad in the US, where four wineries blamed Altec for tainting large numbers of their wines. This led to legal action that is still ongoing, with a decision due from the courts in January 2003.

More bad news came from the results of the study conducted by the Australian Wine research Institute (AWRI). This scientifically rigorous study is currently monitoring the performance of a number of closure types over time, including Altec. When the 24-month results were published they reported that each of the bottles sealed with an Altec closure was found to have a TCA-like aroma, and follow-up chemical analysis found detectable levels of TCA in each of the Altec samples analysed. Nicolas Serpette, communications manager of Sabaté, confirms that the sales of Altec in 2002 have been affected by this adverse publicity. 'We've been exposed to very negative coverage' he says. 'We have lost a lot of US customers in particular, who are now scared of using Altec.'

SABATÉ'S RESPONSE - Some credit must go to Sabaté for its reaction to this criticism. The typical cork industry response to a problem like this with simply be to treble their marketing and PR budget, rather than tackling the problem itself.

Serpette subtly acknowledges this by insisting on Sabaté's determination to 'communicate transparently', and that this 'positions Sabaté differently of other elements in the cork sector'. He adds that, 'PR isn't the answer; people want facts'.

SABATÉ'S RESPONSE INVOLVED THREE STRATEGIES - First, the company instituted a new quality control standard. Every batch of Altecs leaving the factory was subjected to testing, and the company now ensures that no batch leaves with an average TCA concentration of greater than 3 parts per trillion (part per trillion, or ppt, = nanograms per litre, or ng/l).

Second, Sabaté has invested substantial sums of money developing a new technique, CO₂ extraction, for the removal of TCA from the cork 'flour' that is the basic constituent of Altec. This involves using CO₂ in its supercritical state, when it has properties somewhat in between those of a gas and a liquid. Basically, if you pressurise a gas at a certain point it becomes a liquid. If you then juggle the parameters of pressure and temperature, at a certain point – known as the critical point – the interface between the two disappears, and you then have the penetration power of a gas and the extraction power of a liquid. This is the principle used for decaffeinating coffee, and its claimed to remove any TCA that might be present in the cork microparticles.

Third, Sabaté commissioned an impartial, wine industry-led research programme to look into actual and perceived TCA levels across a number of closures – including pre- and post-quality control Altecs, and the new prototype Altecs made with the CO₂ extraction process – with both red and white wines. To co-ordinate this research effort, Sabaté hired Cube Communications, a relatively new UK-based PR company. Cube's James Gabbani, who was in charge of the project, was initially unsure about whether Cube should associate itself with an issue that carries such a high risk of damaging fallout. Gabbani decided that the only way Cube would get involved was if the 'trial was run in a way that we knew was beyond reproach, so we wouldn't get our fingers burnt'. He adds that, 'Sabaté has held to that all the way through.'

STUDY METHODOLOGY - From a journalistic viewpoint it is entirely appropriate to be somewhat cynical about a study of closure performance funded by the manufacturer of the closure in question. I wasn't expecting a trial funded by the cork industry and put together by a PR company to be terribly scientific. But close scrutiny of the methodology reveals that this is a properly designed, rigorously conducted study, the results of which have been subjected to thorough statistical analysis. At this stage I must state, for the record, that I have no involvement with either Sabaté or Cube, and my perspective here is that of an independent journalist. Cube convened a star-studded panel of 15 wine industry figures to participate in the trial and monitor its progress. As well as helping to decide on the study methodology, the panel chose two wines from an available selection, one white and one red, which were then bottled using a variety of closures. The procedure used for analysis was based largely on the methods used by the AWRI in its benchmark closure trial. Chemical analysis of 2,600 bottles for TCA was carried out by the Cambden and Chorleywood Food Research Organisation (CCFRA) using solid-phase micro-extraction and gas chromatography/mass spectro-

metry to a tolerance of 0.2ppt. Cube emphasises that no other study has been carried out on this scale assessing TCA down to such a minute concentration. A total of 528 of these bottles were also tasted by the panel, to compare the actual versus perceived TCA occurrence. These tastings were spread over four sessions at three-monthly intervals. When wines were tasted, CCFRA staff were on hand to take two samples from each bottle, which were then sealed in individual glass capsules with foil caps, transported to the lab and analysed with minimal delay. The raw data were passed on to an academic statistician, Russel Gerrard of City of London University, for analysis.

RATES OF TAINT : HOW THE CLOSURES PERFORMED - The results provide some welcome news for Sabaté. Most significantly, the new CO₂ extraction process seems effective at removing TCA from the cork 'flour' used in the Altec manufacturing process. For four of the closures, the three prototypes and the ROTE, there is no significant TCA in the wine. There is one slightly anomalous reading for the red wine sealed with the ROTE, where one of the bottles showed a TCA level of 1.4ppt, possibly through airborne contamination during the bottling process. Both the pre- and the post-quality control Altecs show some TCA contamination of both the red and white wines. Interestingly, the post-quality control Altecs have higher levels of TCA than the pre-quality control Altecs, which caused all the problems for Sabaté in the first place. Is this bad news for Sabaté ? It depends. If you look at the levels of TCA involved, they are extremely low – well below 2ppt. For the post-quality control Altecs, it is clear that they meet the new standard of less than 3ppt. With the pre-quality control corks, the likelihood is that the batch used in this study is a good one, and not one of those likely to have caused the taint problems with which Altec has become associated. I asked Nicolas Serpette about this, but he was unable to discuss the taint rates Sabaté found in pre-quality control batches of Altec because of ongoing legal action in the US. Evidently, though, with the current standard of 3ppt, some batches with higher TCA levels are not now leaving the factory, but previously would have.

TASTER THRESHOLDS FOR TCA ?

This raises an important question. At what level does TCA become a problem ? Is there a threshold concentration below which TCA is undetectable by a taster, and above which is it identifiable ? It would be extremely useful for the wine industry if we could identify a cut-off point above which TCA is problematic, and below which it can safely be ignored. So does such a threshold exist ? In short, no. One of the significant general findings from this study is that the data across all tasters show that the notion of a threshold for TCA is not tenable. Russel Gerrard, the statistician who analysed the findings, states that 'the proportion of bottles identified as containing TCA increases steadily as the measured TCA content increases, rather than jumping from a lower value to a higher [value] as the TCA content passes some cut-off point'. Gerrard's statistical analysis reveals some interesting findings. These show that half of tasters will detect TCA when it is present at 1.2ppt in white wines and 2.5ppt in red wines. Three quarters will detect it when it is present at 2.07 ppt in whites and 3.93ppt in reds. Bear in mind, though, that even for this expert group of tasters, for both red and white wines there was more than a 10% chance of them detecting TCA when there was none present, itself a rather startling statistic.

These figures correlate reasonably well with some other recent data on TCA detection and recognition from the Wine and Spirit Association's (WSA's) Musty Flavour Defects in Wine Survey. Although not a focus of the WSA's study, the published report provide some measurements of the participants' sensory thresholds for TCA in white wine, looking at the thresholds for both detection (when participants could spot something was wrong with the wine) and recognition (when they could identify the flaw as TCA). The average values for these were 1.5ppt (range 0.5–10ppt) and 6.5ppt (range 2.5–20ppt) respectively for 28 participants spread over two sessions. What does this say about Sabaté's decision to set its batch quality control level at 3ppt TCA ? For white wines, the data from the current study suggest that the vast majority of tasters would report a wine with 3ppt TCA as being tainted. For reds, it would be just over half the tasters. But bear in mind that the tasters in this study were all experts who were actively looking for TCA. The fact that they were calling clean wines tainted more than 10% of the time suggests they were being overzealous in diagnosing slight differences in the samples as TCA, even when they are not detecting any mustiness. At each session they were simultaneously assessing dozens of samples of the same two wines, red and white, so any differences would be immediately apparent. It would be interesting to see the same data gathered with a range of different wines, and with a non-expert group who were not actively looking for TCA.

THE DIFFERENCE BETWEEN WHITES AND REDS

Another interesting finding is that even expert tasters are significantly better at detecting TCA in white wines than in red wines. Perhaps more surprisingly, though, is that the technical analysis indicated that white wines in this sample actually had more TCA than the reds. The underlying reason for this is a matter for speculation: it may be that there is some sort of chemical interaction between TCA and specific components of red wine. Nonetheless, it is an intriguing finding.

CONCLUSIONS

The key conclusion from this study is that Sabaté's CO₂ extraction process works, and produces closures which are free from TCA. Serpette revealed that Sabaté has recently taken the decision to press on with the commercialisation of the CO₂-extracted prototype closures. 'The process has been validated at the lab and semi-industrial scale, but now we need to build a new factory'. Serpette estimates that the first products should be available 24 months after the first stone is laid, and he anticipates that the new Altecs will be on the market at the beginning of 2005.

In the meantime, what of the post-quality control Altecs ? It seems that without the CO₂ extraction step, it is inevitable that cork-based products such as Altec will have a residual level of TCA. It is not clear whether this level is problematic. Sabaté is convinced that the current taint levels are not significant and will cause no problems. However, the data here on taster detection limits show that wine industry professionals actively looking for TCA in Altec-sealed wines report its presence in approximately 35% of reds and up to 60% of whites, albeit with a high false positive rate. In the absence of further data, wine producers will have to decide for themselves whether they consider this to be a significant risk for their products. A question mark surrounds whether

this level of TCA would be noticeable by the consumer.

One key question that remains to be answered is how well Altecs perform in terms of permeability. Are they as effective as screwcaps in retaining freshness over time ? In this respect it's a shame that the current study didn't involve measurements of free SO₂ levels, a relatively simple test. The AWRI trial found that decline in free SO₂ is a useful surrogate measure for oxidation, and that small differences in SO₂ concentrations at early stages are strong predictors of differences in later sensory performance. The sensory analysis carried out in the tasting component in this study looked at subjective measures of freshness, fruit and finish, and indicated that the Altecs performed well in comparison with screwcaps. These data are backed up by the measurements of free SO₂ in the AWRI trial at the 30-month time point, where Altecs performed as well as screwcaps and better than both the synthetic and natural corks in the study.

In closing, these are clearly important data, answering some questions and raising others. Credit is due to both Sabaté, for the openness with which it has conducted this study and released the data, and to Cube, for overseeing a scientifically rigorous study and ensuring proper statistical treatment of the results.

Could this be a new dawn for the cork industry ?