The Australian Cork Supply Industry: Its Resources and Direction

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Introduction
The Australian Cork Association perceives that the response of the Australian cork industry to client concern regarding physical, sensory, and quality issues, can be divided into the following categories:

• supply situation;
• physical performance;
• sensory performance; and
• quality issues.

Supply situation
There are approximately twelve local cork suppliers, eleven of which have production facilities in Australia. Six are situated in South Australia, three in New South Wales, and two in Victoria. The larger companies have quality control laboratories, staffed with qualified personnel, and are implementing a total quality management system, generally in accordance with AS 3902. The Australian Cork Association has six members, and is considering applications for membership from a further two.

One criticism of the cork industry is that it has been slow to respond to concerns regarding cork quality. To understand this criticism, it is necessary to review its history. Twenty-five to thirty years ago, the cork business was a relatively uncomplicated one. Once each year, cork importers would travel to Portugal and Spain, meet with their numerous suppliers, negotiate prices, view stock and make purchases. In some instances, a parcel of cork was purchased on the spot if it was considered a particularly good buy. It was not uncommon for importers to have six, eight or more suppliers. The major buying criteria were visual quality and price. This approach was not incorrect, but simply the way cork was purchased. The majority of corks entering Australia at that time were plastic-flanged stoppers, used in flagons and bottles for wine, spirits and liqueurs. It was not so long ago that Australia had a successful spirit industry, with familiar brands such as Bond 7 and Corio. For many years, both used flanged stoppers.

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It is important to control the headspace in a sealed bottle. This distance should be approximately 13 mm at a wine temperature of 20°C. As most wines are bottled at 12–15°C, additional space must be provided. As a guide, the headspace should be increased by 0.5 mm for each 1°C below the optimum of 20°C. For example, when bottling at 12°C, a 17 mm headspace is required. The importance of this rule cannot be overstated.

Concentration of carbon dioxide (CO₂) in the wine. Although CO₂ is soluble in wine, an increase in bottle temperature will cause an increase in headspace pressure associated with this dissolved gas. The internal bottle pressure should not exceed 1.3 atmospheres.

The following is an example of poor bottling practice. A wine is bottled without vacuum at 12°C, with a headspace of 13 mm and an internal pressure of 1.3 atmospheres. If the bottle temperature is increased to 30°C, the headspace will be reduced to 4 mm and the internal pressure will exceed 100 kPa, which may cause the seal to fail. The result will be movement of the cork or, if the bottle is lying down, wine seepage or leakage.

Corking machines
It is important to maintain any equipment in good working order, and the corking machine needs constant care. Jaws should be cleaned and checked for damage regularly, and damaged jaws should be repaired or replaced. Machines with damaged jaws should not be used, as the resultant damage to the corks and wine may be expensive. Careful attention should be paid to location rings, which must be correctly matched to the bottle. Machines should be fitted with devices to evacuate the headspace immediately before corking. Such devices may be fitted to existing machines that lack them. Vacuum heads are designed to suit particular bottles, so the correct vacuum head should be obtained for each bottle type.

Cork recovery time
Twenty-four hours is considered desirable, but is impractical in today's environment. Corks require some settling time, and five minutes prior to packing is the minimum, with a little longer being preferable. A cork will actually recover approximately 97% of its original volume in five minutes, although the last 3% takes considerably longer.

Storage
Not everybody can afford to invest in air-conditioned storage areas. However, when the value of the wine in the storage area is considered, the cost of such facilities might be worthwhile. All storage areas should be insulated, but insulation alone affords only partial protection. During summer, when consecutive days may exceed 30°C, the eventual temperature increase of the area will be retarded by the insulation. Installing a cooling system, which automatically starts at a given temperature, is very good insurance.

Transport
Many wine companies ship wine in standing cartons. This was considered a risk in the past. However, considering that corks today are treated and sealed with a coating which assists insertion, extraction and bottle sealing, keeping the cork wet, as was required prior to treated corks, is no longer necessary in the short-term. Far less leakage problems occur with packs that stand up than those which lay down, and breakage is minimised. For storage, it would be wise to lay the wine down, as there is no evidence regarding seal integrity during long-term upright storage.

Sensory performance
Sensory issues should be considered separately, as external and biological contamination.

External contamination
Corks sometimes come into contact with chemicals during transit, and it is important to be alert to this problem. Chemicals can also penetrate the polyethylene bag to contaminate corks.

Biological contamination
Biological contamination may be described as an environmental contaminant which should be objectively identified.

For some years now, the concentration has been on the growth of moulds and scientific research has identified 2,4,6-trichloroanisole (TCA), geosmin, guaiacol, and methylisoborneol as potential tainting compounds. The major area of concern is TCA, identified as a source of cork taint by Tanner and Zanier in 1978. By 1982, their research was acknowledged throughout the world and the industry commenced addressing this problem, which is still the subject of ongoing research.

Part of the answer is the use of corks washed with materials other than those containing chlorine. While this has given a reduction in the incidence of taint, the problem persists. Geosmin is rarely a problem in wine. It may be detected at an early stage but, as it breaks down in acid, it has little, if any, long-term effect. It is more commonly found by sensory analysis in the laboratory than in the finished product. Methylisoborneol and guaiacol are thought to be minor problems.

It would be reasonable to suggest that 70–80% of cork taint, particularly in natural corks, is due to contamination by TCA. There are steps which can be taken by the Australian cork industry to address this problem. One cause is the treatment with chlorinated sanitisers of the timber floors of shipping containers. Importers today are alert to the problems that such containers have caused, and each company has, or should have, procedures in place to check incoming containers. It is the responsibility of local suppliers to have procedures to assist in the identification of problems, and stop them entering the market. This is only possible when the problem is obvious.

The responsibility for eradicating contamination derived from mould lies with the cork producers, chiefly in Portugal, Spain, Italy and France. A good first step would be better housekeeping, thus handling cork in a cleaner environment and a more cost effective manner. Mouldy flavours and odours are, however, not the only cork taints. A cork quality improves, other characteristics become evident, such as ‘corky’ odour (caused by cork wood rather than mould), and treatment characters, such as ‘plastic’ and ‘metallic’. Whether some of these taints may be considered normal bottle variation is uncertain. A study should be undertaken to assess the relative importance of such taints and to assign priority to their resolution. Cork suppliers need the assistance of the wine industry to understand the areas of concern, and encouragement to tackle them.

Agglomerate/composite corks
Over the past five years in Australia approximately 25% of bottled table wines were sealed with an agglomerate type cork, largely because they are inexpensive. The following example demonstrates the cost advantage. Company A buys ten million reference 3 natural corks (38 mm) at a cost of $140/1000. Company B buys the same number of agglomerate corks (38 mm) for $65/1000. Company B thus saves $75 per...
than treatment concerns, chlorine or PMS washing is used to
the exclusion of hydrogen peroxide.
Portuguese, Spanish and Sardinian cork suppliers were
visited, together with many factories and the Portuguese and
Sardinian Research Institutes. Generally, many possible
sources of contamination, but very little effort on testing or the
elimination of this problem, were found.
After this period, contact was initiated with other
Australian wineries. Staff of respected American wineries
were consulted and their methods for checking cork taint
were examined, as a number were also greatly concerned
about this problem. At most of these wineries, 1 cork was
incubated in 100 mL wine, with a variable number of replicates.
Comparisons of trials in which 1 cork was immersed in 100 mL
wine (100 replicates) for 48 hours or overnight (approximately
18 hours) showed that the former gave strong back-
ground cork characters that masked any taint present.
Currently, all samples are incubated overnight.

Summary
The following protocols have been adopted:
• prior to purchase of any cork, the supplier must submit a
  sample of treated corks, which must be representative of the
  whole shipment.
• on receipt, 100 corks are tested (1 cork in 100 mL wine,
  replicated 100 times).
The acceptance criteria are as follows:
• if one or less corks in 100 is affected by a TCA-type taint,
  the batch is accepted and physical checks of quality proceed;
• if 2 corks in 100 are affected, the test is repeated; and
• if 3 or more in 100 are affected, the batch is rejected.

Once accepted, the corks are printed. On arrival at the
winery, the taint test is repeated and may be performed on 200
corks of a large batch. If the batch passes this secondary
assessment, the grade and microbiological status is checked.
The cork is then approved for use. By utilising these criteria,
a marked reduction in the incidence of taint has been
achieved.

Quality issues
Quality issues cover many areas, with true quality coming
from a positive attitude and flexibility. Most cork importers now
deal with one main supplier. This is important, as it facilitates
a clear understanding and discussion of the issues, and their sub-
sequent resolution. The industry is committed to the imple-
mentation of the ISO/AS 9000-series (Standards Australia
1994) total quality management approach. J.B. Macmahon Pty
Ltd is the first Australian cork supply company to achieve
accreditation. A qualified person is required to manage cork
quality, and most cork companies employ such personnel.

Conclusion
Many gradual changes have taken place over the past 25 years
and the cork supply industry has made considerable improve-
ments. All goals have not been achieved, and considerable
work remains to be done. The goals can be achieved with the
assistance and encouragement of the wine industry.

References
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