Closures and Quality Control at BRL-Hardy Ltd and the Winemakers’ Federation of Australia Cork Guidelines

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The BRL-Hardy approach to closure quality

The philosophy governing the purchase of closures at BRL-Hardy involves several critical factors.

1. Only approved suppliers are used.

The criteria for this approval are based on the results of selective testing and long-term trials, as well as the cork supplier’s history of supply and the extent of service provided. This ensures some degree of confidence in the supplier, reduces variation in the products purchased, and assists in the maintenance of the relationship with the supplier. One of the benefits of this approved supplier system is consistency of supply. Familiarity with the performance of the supplier’s corks is thus established.

2. The identity of the initial processor and the processes used (such as chlorine or peroxide bleaching) should be known.

This will reduce variation and unexpected performance characteristics. Little benefit is perceived, however, in knowing the precise source of the corks. The knowledge of ‘which side of the hill’ was not considered of real relevance.

3. A sample of the batch is always tested prior to delivery.

This involves both physical and taint testing.

4. Long-term trials to evaluate the performance of existing suppliers against potential suppliers with similar products are conducted.

Batch variation is a major problem, both in terms of taint and physical performance. While cork is a natural product and some variation must be accepted, its origin is often used as an excuse for poor performance. However, poor quality such as excessive variation in treatment application is common, and is considered unacceptable.

Metal closures are not routinely tested for taint, as suppliers are relied upon to supply caps of acceptable quality. New types of closures are tested more thoroughly to determine their sealing and taint performance levels.

Cork assessment criteria

The main parameters used at BRL-Hardy to assess cork quality are:

- Cork grade
- Moisture level
- Dust
- Heat stress
- Extraction force
- Rotational force
- Taint

Each of these parameters is discussed below. Tests are performed on samples of each batch that are provided by the supplier before delivery is made. This reduces the need for BRL-Hardy to allocate resources to sampling.

Cork grade

Cork grade is assessed visually to ensure that the product received corresponds to that ordered and paid for. Corks are graded according to the percentage of AAA (first grade), AA, A and B grade in the batch. The presence of major defects, such as green wood, is noted.

Moisture

The moisture level is checked because it is critical to the performance of the cork on the bottling line. It should be 6–8 % for straight wine corks.

Dust

A turbidimeter is used to calculate the effectiveness of the de-dusting process used by the supplier. A sample of 10 corks is placed into a flask with 500 mL distilled water. After mixing, the turbidity of this water is measured.

Heat stress

Bottled wines are subjected to heat stress by storage at 35°C for 7 hours. This is considered to give an indication of the quality of the surface treatment. The dimensions of bottles subjected to this test are first determined, and the concentration of carbon dioxide (CO₂) in the wine is checked. The latter should be less than 1.0 g/L, and the wine temperature 15–20°C. The ullage distance should be 13 mm and vacuum must be achieved when the cork is inserted.

Extraction force

Extraction force (at both room and refrigerator temperature) is a measure of treatment performance. The test must be made at a range of temperatures to fully assess the performance of the cork treatment. Some corks extract perfectly at room temperature, but are impossible to remove when cold.

Rotation

The resistance of the cork to rotation (torsional force) is checked by the simple but accurate method of marking the top of the cork against the top of the bottle, inserting a cork screw and twisting by hand. A cork that turns in the bottle does not have the correct treatment level for the density of the cork.

Taint

Short term or overnight taint trials are carried out for each batch of cork. The method used is similar to that which appears to be standard in the wine industry, while meeting the assessment procedures described in Australian Standards 2542 and 2609 (Standards Australia 1984, 1983). These standards describe methods for organoleptic assessment and acceptance and rejection levels due to taint. The number of corks per unit volume of wine has been varied in an effort to improve the taint testing method. Encouraging results were obtained using 2 L flagons containing 35 corks in 1300 mL wine. The resultant solution was presented in an individual glass. This approach permits an increase in the number of corks assessed, such that an incidence of cork taint of 3% should be readily detected. Short-term testing is considered sub-optimal, as it may not reveal all taints, while long-term trials are not usually statistically valid.

Taint tests are carried out prior to printing of corks to avoid the
problems associated with the rejection of branded corks. Printed corks have been found to provide a character that is detected by the assessors. The suitability of an assessor can be determined by comparing their results with the mean of all assessors. The trials are always carried out 'blind'.

New corks and closures are subjected to this testing regime as an initial test. On one occasion, a batch of plastic stoppers showed a plastic taint when assessed, and was rejected. New suppliers’s products or new products are subjected to extra testing. Such tests include the presence or absence of residual oxidants, microbial stability, and the measurement of physical dimensions.

These parameters should be measured by the cork supplier and provided to the user with each batch supplied.

Rationale for long-term cork trials
It is considered important that trials be conducted over longer periods of time, as the expression and incidence of taint under these conditions may be different to that of short-term testing. This is particularly true of sparkling wine corks, for which the difference in observed taint characteristics can be immense. Agglomerate corks may exhibit characters attributed to glue and other materials. As a result, BRL-Hardy uses very few agglomerate corks. The results of the trials conducted over the two time periods are readily compared. Wines are assessed for taint, as well as colour change (absorbance at 420 nm), and loss of sulphur dioxide and ascorbic acid.

The evaluation of cork treatment materials is performed during long-term trials in 750 ml bottles, when the amount of wine travel along the cork may be observed. The bottles are normally observed six and 12 months after sealing. It is easy to assess corks from an individual supplier, or different types of corks. These trials have shown that '1+1' corks (agglomerate corks fitted with discs of natural cork at each end) generally do not seal as well as natural corks or normal agglomerate corks. The '1+1' corks are likened to an end-way bet. Long-term trials of plastic stoppers showed evidence of leakage.

Sparkling wine corks are evaluated over a similar time frame by measuring the recovery after removal. A cork that does not recover and swell to fill the neck will not provide an adequate seal. The loss of CO₂ from sparkling wine sealed with corks is compared to that of control batches closed with crown seals. It is easy to compare the performance of sparkling wine corks from different suppliers.

Differences are often noted in the recovery characteristics of different grades of such corks, as the recovery of the agglomerate material is related to the quality of the end discs. In response to a suggestion from a supplier that such recovery might be influenced by the CO₂ pressure in the bottle, samples of both sparkling and still wines were sealed with sparkling wine corks from the same batch. It was surprising to note that, after 2 months, the corks extracted from the bottles containing still wines had not recovered as completely as those containing sparkling wine. This suggests that flat sparkling wine, which is often attributed to a poorly-performing cork that appears to have not recovered its shape after insertion, may have been flat when bottled.

The disadvantages of long-term trials are:

- they are extremely time-consuming to set up;
- they require large quantities of bottles and wine, which are generally rendered unsaleable by the test; and
- only a relatively small number of each type of cork can be assessed, making the results subjective.

Despite these limitations, the trials are considered an effective way of evaluating new corks or closures. Experience suggests that some corks, if used in production without proper testing, could prove disastrous. The defects which may be found include:

- corks (especially colomated or filled types) which push or turn in the bottle;
- corks which cannot be removed when cold;
- wine travel due to poor application of treatment;
- high levels of taint with agglomerate corks; and
- random oxidation of the wine that may be due to cork processing.

This work does not eliminate all problems. For this reason, staff at BRL-Hardy believe that more work needs to be undertaken by international and domestic suppliers to improve the standard of cork products supplied to the wine industry.

Winemakers’ Federation Cork Guidelines
The Winemakers’ Federation Cork Guidelines were produced by the Federation’s Packaging Committee. Much of the work in formulating the current guidelines was done by Geoff Kurtz of Orlando-Wyndham. Assistance was received from the Australian Cork Association, the technical staff of Orlando-Wyndham, BRL-Hardy, Southcorp Wines, Yalumba Wines, The Australian Wine Research and Technology Institute and A. m. n. Imazas Spa.

Guidelines have been prepared for both straight and sparkling wine corks. They were produced to provide consistent terminology for cork suppliers and users. They also provide a good base for the establishment of cork quality assurance systems by new users, and minimum requirements for cork purchasing specifications. The provision of descriptive terms and testing parameters permits the assessment of cork performance.

The guidelines also provide details of good corking practice. They specify:

- the relationship of cork diameter to bottle neck dimensions;
- headspace distance;
- corking compression;
- storage of corks prior to use;
- corker jaws; and
- storage of wine after corking.

The guidelines do not aim to advise cork users of the appropriate quality or characteristics of a particular cork for any specific use, nor discuss ‘acceptable’ limits for the incidence of taint (if such a thing exists), as different suppliers and wine producers have different specifications.

Summary
Despite the description of cork as a ‘natural product’, problems of quality may be caused by the manufacturing process and consistency should be demanded by users. Alternatives to cork, such as ROTE closures (roll on tamper evident, such as the Stevin), provide a better seal than cork. If they are to be widely adopted, some problems need to be overcome. Some extra equipment such asappers may need to be fitted to existing bottling machines, and a means of achieving vacuum in the headspace, as is available with existing corks, would be required. This technology is available, and the problems may thus be resolved. Cork, however, remains the stopper of preference, as an adequate cork look-alike is not available at present.

References