

## SPECIAL R&D&I: EVOLUTION OF MECHANICAL BEHAVIOUR OF THE STOPPER AS A FUNCTION OF TIME OF CONTACT BETWEEN CORK AND WINE

***Rotllan Torra is absolutely certain that cork plays a very important role in the process of wines for aging.*** This role, however, must be based upon discretion: this is to say, the success of the "mission" carried out depends upon it going unnoticed. The main problems related to the properties of the bottle stopper have to do with the presence of leaks and the appearance of unwanted odours and flavours, both of these latter factors being attributed to cork.

The problem of leaks may be caused by excessive pressure caused by incorrect corking and improper storage, but leaks also may result from a defective stopper that does not provide the necessary degree of tightness. This latter problem may result from improper inspection, the presence of anomalies in the stopper, and a treatment of the surface of the stopper that has not been properly carried out.

Rotllan Torra has also compiled studies regarding the publication of other results of studies regarding the mechanical behaviour of cork as a result of it having been in contact with wine, taking into account two specific phenomena: the penetration of the cork by the wine and the softening that takes place in any material once it has been subjected to any pressure. The ISO and UNE (Unified Spanish Standards) conduct the diametrical recovery test after five minutes. This is justified because what is of interest is knowing how the

stopper is going to behave during the bottling process, and guaranteeing that sufficient pressure is present at the time that the bottle is laid down.

Rotllan Torra has studied these two parameters: force of extraction and diametrical recovery 24 hours following uncorking.



For our wines Amadis and Tirant, a 54x24 mm cork stopper of extra quality is used.

In order to this, four different types of corks were used: high-, medium- and low-quality natural corks, and technical corks. A mixed paraffin and silicone based surface treatment was applied to all of the corks. Bottles containing 750 cc of three different types of wine were corked: young white, young red, and vintage. Finally, also researched in the study was the behaviour of unsupervised stoppers, of the selected Reserve and Grand Reserve wines, where the cork-wine contact was carried out in progressively longer periods of time.

The corking was performed by a bottling machine with a vacuum system and a speed of 12,000 bottles/hour.

The bottles were left standing for 24 hours, after which time they were laid down, remaining in storage at a temperature that was always lower than 22°C. The tests of extraction and diametrical recovery were carried out at five different weekly storage intervals: 5, 35, 58 and 83 weeks.

No significant differences could be observed in the various tests carried out on different types of wine so the data was put together as if it were an only test.

***The high-quality corks, such as those used by Rotllan Torra, showed a force of extraction ranging from 15 to 20 DAN after 83 weeks of being on the bottle.*** With the passing of time, the evolution appears to show a slight tendency to decrease, which in most cases is insignificant. Tests carried out on the unsupervised corks and on Reserve and Grand Reserve wines also showed a tendency to decrease with the passing of time, although the longer length of the corks and the lack of a proper treatment of the surface of the stopper in aged corks caused the values to be equal or higher to those obtained in other tests.

The diametrical recovery showed less variability between the types of stoppers and a higher relation to the contact time. This parameter, which indirectly points out the residual deformity of the stoppers when they have been extracted, is what best reflects the capacity of the cork stopper of being maintaining a proper closure during lengthy periods of time. The inferior value obtained with natural stoppers was of 84.7% after 83 weeks of bottling, but, in general with natural one-piece stoppers it has been proven that this figure can be above 85% after remaining for more than five in the bottle neck.