



Performance of Disks as a TCA Barrier in Technical Corks

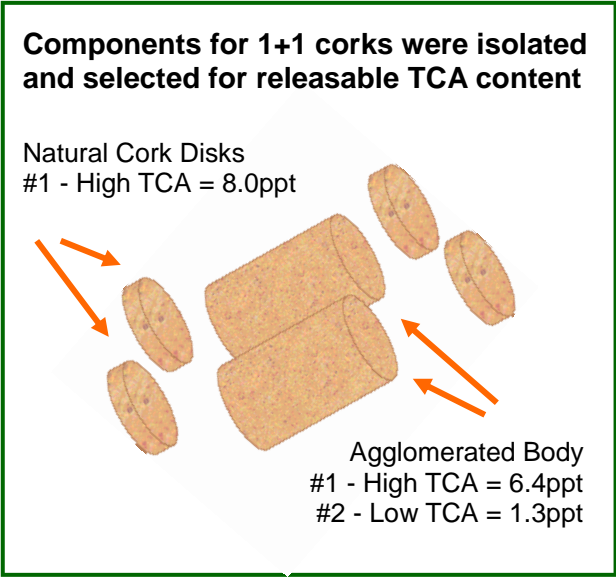
The CQC recently completed a three year study of technical closures that illustrates the effectiveness of discs as a TCA barrier in 1+1 corks.

Questions to be answered were:

1. Are natural cork disks in 1+1 corks an effective barrier to TCA originating in the agglomerated body?
2. Are group soak values for releasable TCA able to predict overall performance?

The study concluded with a bottling test that featured 1,152 individual bottle samples comprised of combinations of Low TCA and High TCA disks and agglomerate bodies.

The final analysis, run after 24 months in the bottle, clearly demonstrated that good quality disks effectively prevented TCA from transferring to finished wine regardless of the quality of the agglomerate body.



The effectiveness of group cork soaks is not as direct as seen with natural corks. Technical corks with clean disks and high TCA agglomerate produce a taint rate of less than 1% even though the average group soak score was 6.0ppt. Fortunately, recent advancements in cleaning agglomerate have virtually eliminated the occurrence of high TCA agglomerate material.

Current results show that 95% of CQC samples of 1+1 corks produce TCA scores below 1.5ppt. We feel that by applying a stringent threshold to 1+1 corks we can eliminate those populations that have imperfect disks, and identify corks with superior characteristics—as seen in group #5 below. In the CQC study corks with group scores below 1.5ppt have shown excellent results.

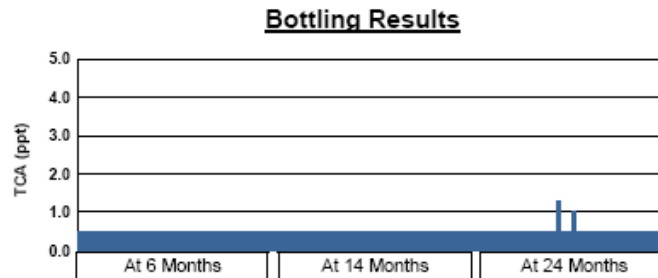
Summary Performance		Group Score	Components (ppt)		Flag % Bttls >2ppt
Group	Description		Disk	Body	
1-3	Low Disk + High Body	6.00	< 1.0	6.40	0.9%
4	High Disk + High Body	8.10	8.00	6.40	16.7%
5	Low Disk + Low Body	1.20	< 1.0	1.30	0.0%
6	High Disk + Low Body	3.20	8.00	1.30	11.8%
7	No Disk + High Body	6.40	none	6.40	32.6%
8	No Disk + Low Body	1.30	none	1.30	0.0%

Baseline Levels

Baselines were established by bottling two sets of wines with agglomerate bodies without disks. Not surprisingly, wines with the Low TCA agglomerate did not exhibit significant TCA in bottled wine. The average of the original groups soak was 1.3ppt. None of the 144 wines bottled with this closure had TCA levels over 2.0ppt

No Disk + Low Body

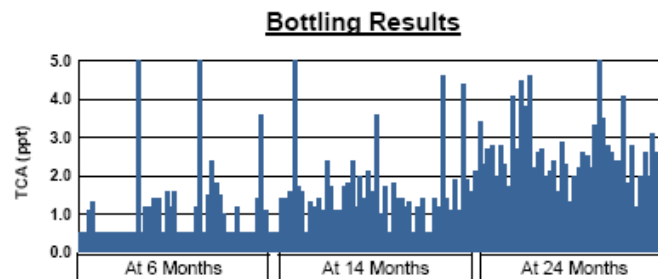
<u>Components</u>	<u>TCA(ppt)</u>
Avg of Disks	
Avg of Bodies	1.3
Group Soak	1.3
Sample Bottles	144
Average TCA(ppt)	0.5
Flags (>2.0ppt)	0.0%



Wines with the High TCA agglomerate did not fair so well. The average of the original groups soak was 6.4ppt. Almost one third of the 144 wines bottled with this closure had TCA levels over 2.0ppt.

No Disk + High Body

<u>Components</u>	<u>TCA(ppt)</u>
Avg of Disks	
Avg of Bodies	6.4
Group Soak	6.4
Sample Bottles	144
Average TCA(ppt)	1.8
Flags (>2.0ppt)	32.6%

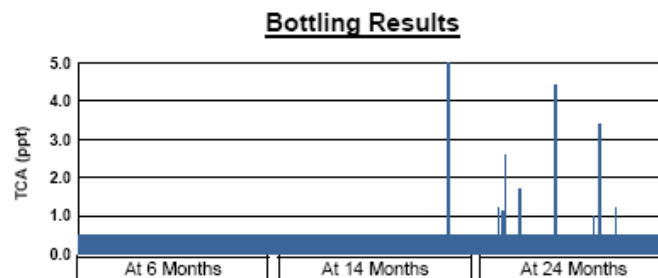


Adding Disks

In a test of attaching Low TCA disks to High TCA bodies, this study included three different visual grades of Low TCA disks. Because there was no significant difference between grades, the results of these 429 samples were combined to show that the disks were extremely effective in preventing TCA from migrating to the bottled wine. The addition of clean disks reduced the number of flagged bottles from 32.6% to less than 1% from the same agglomerate base.

Low Disk + High Body

<u>Components</u>	<u>TCA(ppt)</u>
Avg of Disks	0.5
Avg of Bodies	6.4
Group Soak	6.1
Sample Bottles	429
Average TCA(ppt)	0.6
Flags (>2.0ppt)	0.9%

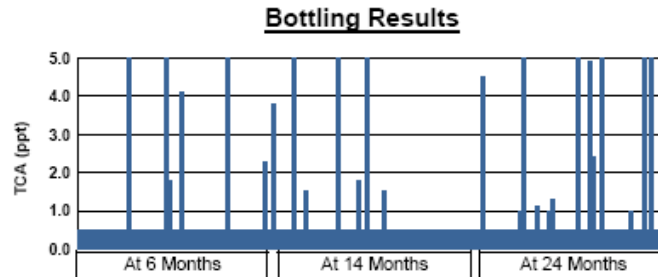


Adding Disks....

In an inverted test—High TCA disks were combined with low TCA agglomerate to create a group of corks that had a group soak score of 3.2ppt and produce 11.8% flags in bottled wine.

High Disk + Low Body

<u>Components</u>	<u>TCA(ppt)</u>
Avg of Disks	8.0
Avg of Bodies	1.3
Group Soak	3.2
Sample Bottles	144
Average TCA(ppt)	2.1
Flags (>2.0ppt)	11.8%

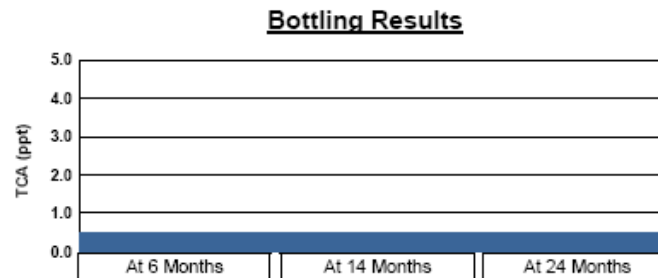


In a scenario that mirrors the present sampling experience of CQC member, clean disks were combined with Low TCA agglomerate to create a group of corks that had a group soak score of 1.3ppt. The 144 wines bottled with these corks developed no flags and no measurable TCA .

This is particularly reassuring because 95% of CQC 1+1 samples produce TCA scores of 1.5ppt or less. We feel that by applying a stringent threshold to 1+1 corks we can identify those populations that have imperfect disks. Clearly, those populations with High TCA agglomerate are easily visible.

Low Disk + Low Body

<u>Components</u>	<u>TCA(ppt)</u>
Avg of Disks	0.5
Avg of Bodies	1.3
Group Soak	1.2
Sample Bottles	144
Average TCA(ppt)	0.5
Flags (>2.0ppt)	0.0%



NOTES:

- Group cork soaks consisted of 50 corks soaked for 24 Hours in a 10% ethanol wine solution.
- Minimum reporting levels for our TCA analysis is 1.0ppt.
- Scores of <1ppt are entered as 0.5 ppt to calculate averages and other statistical descriptions.