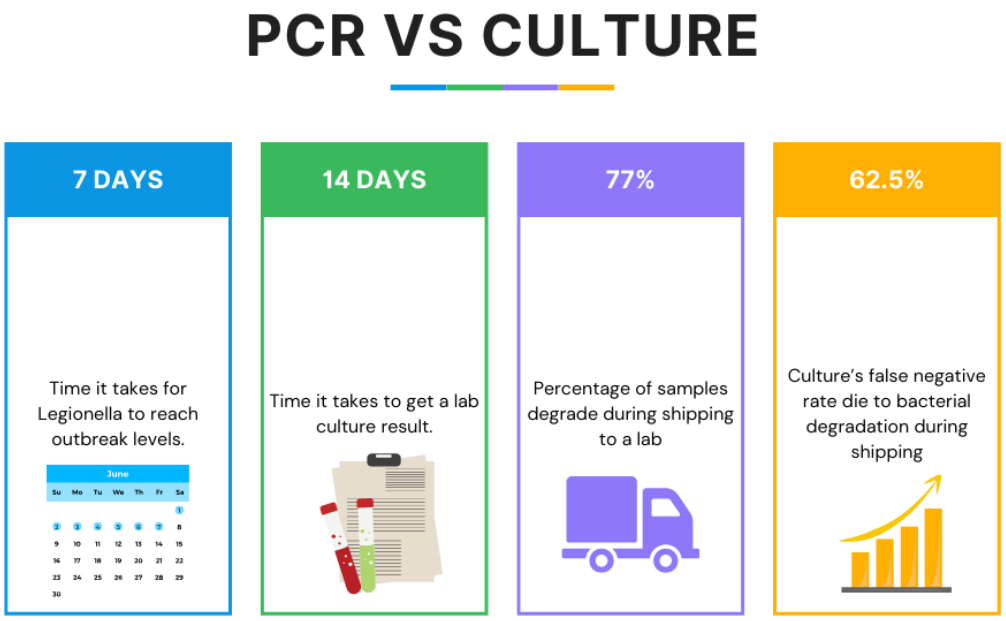
Understanding the Differences Between "Live," "Culturable," and "Viable" in Legionella Testing

In the world of Legionella testing, terms like "live," "culturable," "intact," and "viable" are often used interchangeably, but they shouldn't be. While these terms overlap in meaning, each has a distinct definition that's critical to understanding Legionella risk management.

For example, "culturable" does not necessarily mean "live." Some organisms may be viable but not culturable (VBNC), meaning they can still be infectious even if they can't be grown in culture. This challenges the common industry practice of equating culturable organisms with "living" or "viable" ones.

Our PCR methods measure intact cells – that is, cells who have not been destroyed by biocides. It is possible for some dead cells to remain intact for a period (hours) depending on the biocide used (typically non-oxidizers such as glutaraldehyde, quats). It is important to ensure measurement is done after sufficient biocide contact time based on the concentration dosed, as specified by the biocide manufacturer.

PCR has a high negative predictive value relative to culture (If PCR is negative, culture will be negative) but can measure high relative to culture when moderate-high levels of legionella are present. Neither measurement is 100% correct on live determination.



In most jurisdiction culture is the regulated parameter – but it is slow (10+ days) and not conducive to proactive legionella risk management. Culturing testing detects culturable organisms – which the industry often equates to “living” or “viable” organisms. This is inaccurate.

Disinfection processes can yield organisms that are “viable but not culturable”, or VBNC, that still present a health risk.

Most PCR methods detect intact cells – which are cells that have not been destroyed by disinfection processes. This is because DNA from dead, destroyed cells easily pass through the filtration process.

There will be a difference between culture and PCR results, but they tend to trend together especially in systems with elevated Legionella. PCR is most often used as a negative screening test.