

What Test Strips Don't Tell You: Getting Chlorine Dioxide (ClO₂) Right On Farm

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Farmers trust disinfectants to protect herd health and milk quality. Chlorine dioxide (ClO₂) is a powerful choice—but only when used correctly. On-farm test strips and titration kits don't always tell the full story. Some measure non-active ingredients, such as total chlorites, not just active ClO₂. That can lead a user to think a solution is suitable for teat disinfection without knowing if enough active ClO₂ is present for efficacy or if too much is present to be used safely.

A high reading in a test strip doesn't always mean a working teat dip. Here's what to watch for.



Using an ineffective dip can compromise udder health

Chlorine dioxide (ClO₂) is valued because it kills a wide range of bacteria, including both gram-positive and gram-negative species¹. ClO₂ breaks down quickly, so it's usually blended on farm following instructions provided on the product label. This is accomplished by mixing a sodium chlorite “base” with an acid “activator.” The speed of activation depends on pH, time, temperature, and concentration.

With these variables in mind, farmers may want to verify ClO₂ strength before using it as a teat dip. Test strips and titration kits are practical, but each has limits.

Titration kits, and many test strips, measure “total chlorites”—both active ClO₂ and the inactive precursor, sodium chlorite. A high reading doesn't necessarily mean an effective solution.

A high chlorite reading doesn't always mean a working teat dip; some strips can detect non-active ingredients, giving a positive reading even when active ClO₂ is less. When a test strip cannot differentiate between total chlorites and ClO₂, the reading from the test kit only informs the user that ClO₂ may be present. If not enough ClO₂ is present for efficacy, this could lead to milk quality and animal health concerns. Conversely, if too much ClO₂ is present, this could result in a safety concern. When you choose to test ClO₂ on farm, you need to know what each test means—and which may not tell the full story. The best solution is to follow product label instructions to ensure the appropriate concentration of ClO₂, is both safe and effective.

CONCLUSION:

Use titration kits to confirm correct dosing, not to judge effectiveness

Researchers tested four ready-to-use solutions at different points after the recommended activation time. They compared five different test strips and one titration kit against a reference method UV-Vis (ultraviolet-visible spectroscopy, a laboratory-only technique that measures how much light a sample absorbs to determine chemical concentration).

GENERATION OVER 24 HOURS (UNITS: PPM OF ClO₂)

Method		Lab Test	Test Strips					DeLaval Chlorine Dioxide test kit HR
Dilution	Time	UV-Vis (359 nm)	Quantofix 15	Quantofix 3000	LaMotte HR	LaMotte LR	Bartovation	Part Code: 880000407
		3 – 150	0 – 15	0 – 3000	0 – 500	0 – 5	0 – 500	≥50
DL ClO ₂ Product A Base Only	30 min	0	0	0	50	0	0	850
Correct Label Dilution	30 min	23	10	10	100	2.5	50	1000
	2 hr	29	15	25	100	2.5	50	1200
	4 hr	34	15	25	100	2.5	50	1100
	24 hr	95	15	25	100	2.5	100	1000

GENERATION OVER 30 MINUTES (UNITS: PPM OF ClO₂)

Method		Lab Test	Test Strips					DeLaval Chlorine Dioxide test kit HR
Dilution	Time	UV-Vis (359 nm)	Quantofix 15	Quantofix 3000	LaMotte HR	LaMotte LR	Bartovation	Part Code: 880000407
		3 – 150	0 – 15	0 – 3000	0 – 500	0 – 5	0 – 500	≥50
DL ClO ₂ Product A Base Only	30 min	0	0	0	50	0	0	850
Correct Label Dilution	30 min	23	10	10	100	2.5	50	1000

KEY RESULTS:

- Over the full 24-hour generation period, only one of the five test strips maintained accuracy within ±50% of the UV-Vis reference method across all time points. The other test strips either underreported or overreported the concentration of ClO₂ without identifying changes in the amount of ClO₂ active generated even when the concentration doubles in the solution.
- One of the test strips produced positive readings even in solutions without activator, meaning no ClO₂ could have been generated. This confirms they react to inactive sodium chlorite rather than active ClO₂.
- The DeLaval titration kit consistently reported values in the 800–1200 ppm total chlorites range with an increase in reading after ClO₂ was generated, thus allowing for confirmation of successful mixing of the two-part system. It is thus best used as a confirmation of ClO₂ generation.

KEY TAKEAWAYS:

- Test strips can lack selectivity.
 - Given the limitations of individual tests, a two-part verification for on-farm use is a valuable strategy. The DeLaval Chlorine Dioxide Test Kit HR measures total chlorites. It is able to identify an increase in value after ClO₂ is generated, thus confirming that sodium chlorite base has been properly dosed and mixed.
 - Bartovation test strips measure active chlorine dioxide directly, helping to confirm that the solution has generated enough ClO₂ to be effective but is not a safety concern.
 - When used together, these tools provide more complete information. As always, neither test should replace adherence to product label instructions, and instead serve as checks for proper testing.
- Quantofix 15, Quantofix 3000 and LaMotte LR test strips measured low levels of ClO₂, when high levels were present. The reading of “false negative” or lower than actual results can pose a safety concern.
- The DeLaval Chlorine Dioxide Test Kit HR helps check sodium chlorite dosing, but never mistake “total chlorites” for active ClO₂.
- Most importantly, follow label instructions to prepare safe, effective ClO₂ solutions on farm.
- Product labels provide mixing instructions in gallons or whole parts to reduce confusion. For mixtures that are not 1:1, use a pre-programmed mixing unit (CBU) to prevent dosing errors and minimize chemical exposure.

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Important Safety Information:

Always read and follow the product label directions and safety data sheet (SDS) instructions before use. Use proper personal protective equipment (PPE) as specified on the label, including but not limited to gloves, eye protection, and appropriate clothing. This information is for comparative testing purposes only and does not supersede or replace the manufacturer's official use instructions, warnings, or hazard communications. Users are solely responsible for ensuring compliance with all applicable local, state, and federal regulations governing the handling and application of disinfectant chemicals.

References:

¹. Block, S. S. Disinfection, Sterilization, and Preservation, 1991, pp 131–152.

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