Precautions and Checks for Poultry Drinking Water Quality During Seasonal Transitions

POULTRY INNOVATION PARTNERSHIP

visionary change collaboration opportunity

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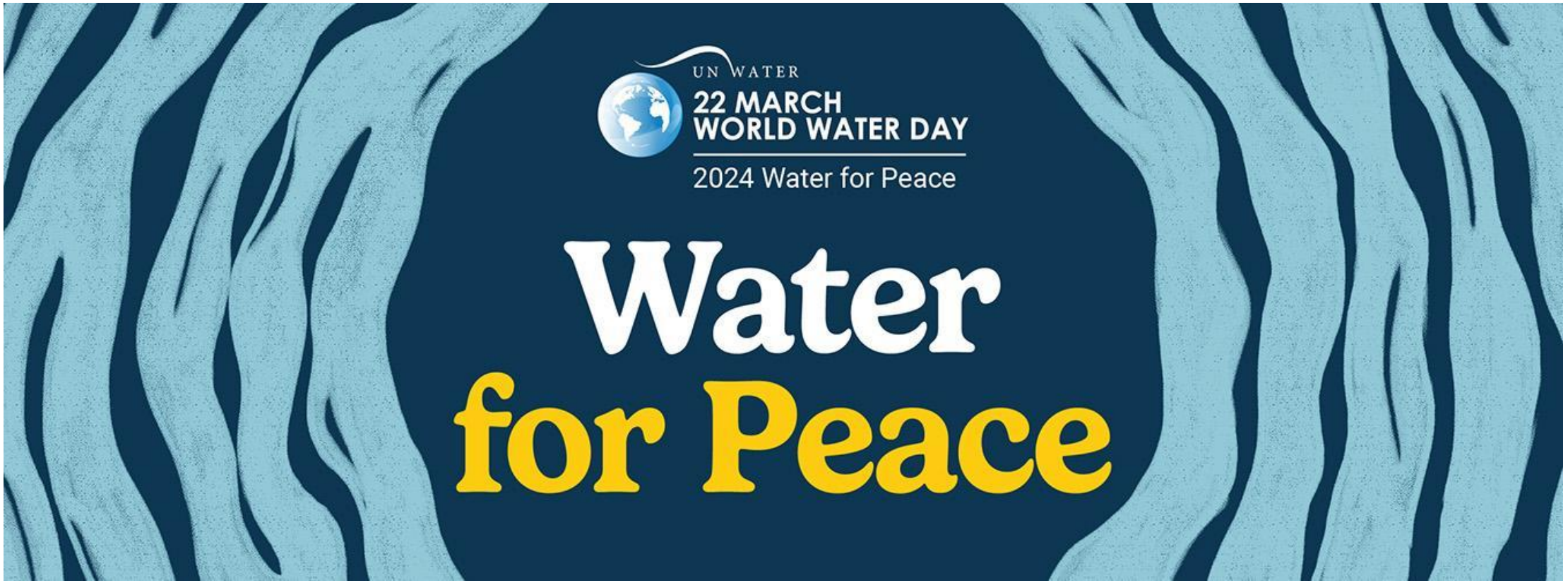
Happy World Water Day!



https://www.un.org/en/observances/water-day

A farm story

- A 30,000-broiler farm
- Water source: dugout
- Final BW was around 2.1 kg
- After 3 cycles of water sanitation, the final BW went up to 2.8 – 2.9 kg
- Sanitation
  - Hydrogen peroxide for cleaning between flocks
  - Chlorine during the flocks

Seasonal variation in water quality

The 6 Main Indicators Of Water Quality

Temperature

Conventional Variables: pH, Total Dissolved Solids (TDS), Conductivity, & Suspended Sediment

Nutrients

Metals

Hydrocarbons

Industrial Chemicals

water temperatures

Microbial growth and algae proliferation

Increased evaporation rates

- Higher concentrations of minerals and dissolved solids in water sources

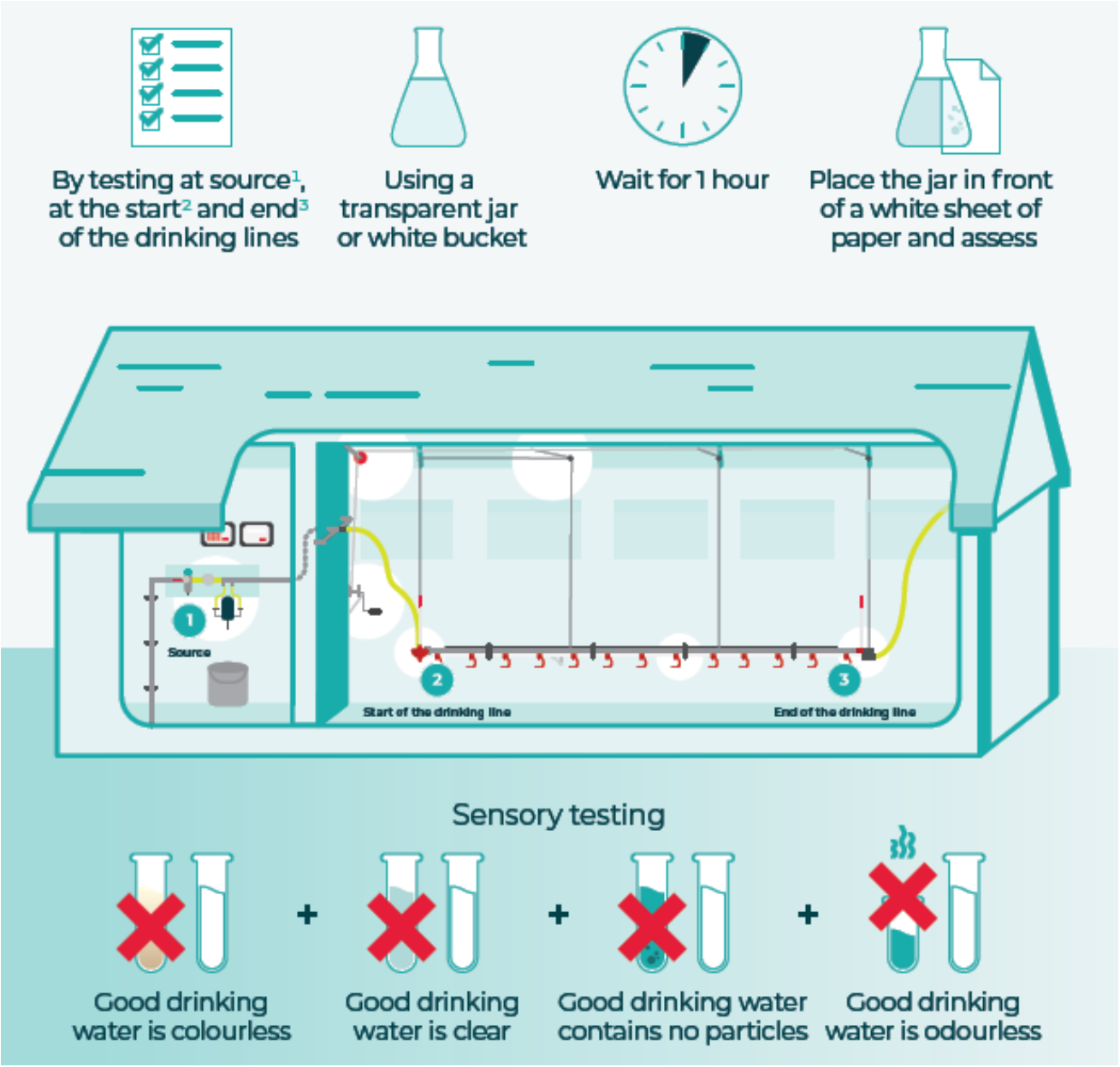
Rainfall

collect harmful chemicals and contaminants along the way

Important precautions and checks on water quality

- Regular monitoring for early detection of changes in water quality and timely intervention
- Proper infrastructure maintenance
  - Inspecting the filter for blockages and wear
  - Checking the storage tank for cleanliness and algae growth
  - Examining drinkers for leaks, malfunctioning valves, or sagging areas
  - Monitoring water flow rate in nipple drinkers
  - Regularly flushing the water line to remove sediment
  - Avoid puddles in the vicinity of the run-off area and poultry house
  - Proper waste removal and composting
- Adjust treatment methods

Looking and smelling regularly (daily)



Picture source: IMPEX Watering Solutions

Inspecting the filters

Algae growth in the filter

Manganese contamination in water

Slimy mess containing iron & bacteria

Photo credit: Proxy-Clean Products

Sagging areas in the drinker line!

Slope pressure regulator

Solution for uneven floor


Waste Removal and
Composting

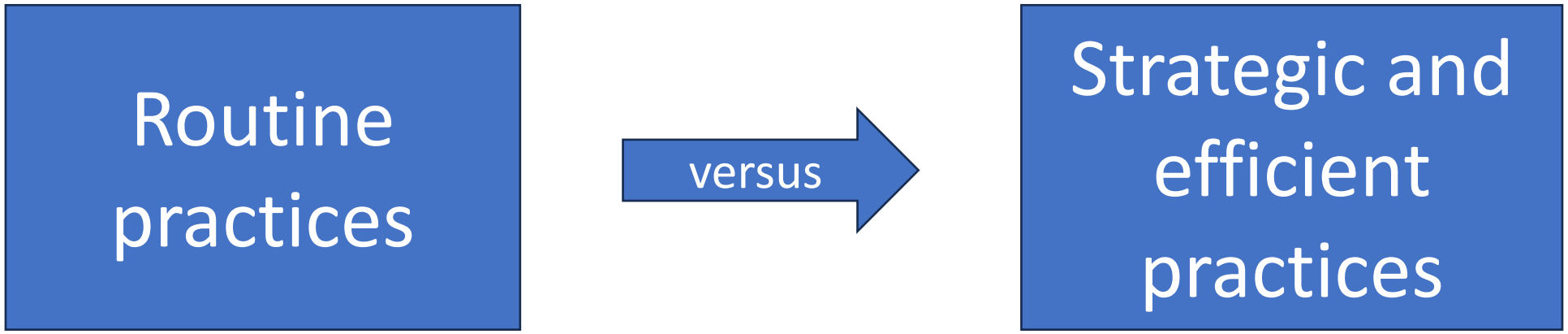
Avoid puddles in the vicinity of the run-off area and poultry house

- Puddles can attract wild birds and vermin
- source of bacteria and viruses from, for example, droppings from birds flying overhead
- if necessary, install drainage to prevent puddle formation

Create a written water treatment program!

- Water line cleaning between the flocks
  - When?
  - What product?
  - How?
- Daily water treatment during the flock
  - Filtration
  - Choose the right sanitation product(s)
  - Make a list of water quality testing tools
  - Check the injectors regularly
  - Gauge the killing power of your disinfectant

Strategic water management practices!



Water microbiological test

Routine practice

- Take a bacteria test
- Sampling protocols:
  - Sterile container
  - What are you testing for?
  - Sample shipment

Strategic practice

- ✓Establish a plan to clean water lines and treat the water daily
- ✓THEN, if there are still problems, dig into getting bacteria tests done

Water mineral test

Routine practice

- Take a mineral test
- Getting the results and not having a clue what they mean

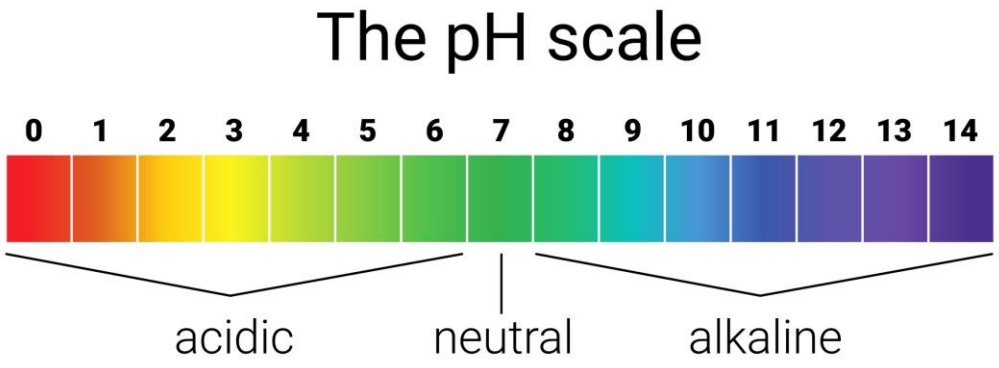
Strategic practice

- ✓Find your previous mineral test (3 years or less)
- ✓Consult the standard acceptable levels for poultry water (*PIP Poultry Water App*)
- ✓Develop a plan accordingly

Using acids in water

Routine practice

- Choose the cheapest acid
- Use the acid without any well-written plan
- Not monitoring the acid effects



Strategic practice

✓Understand the purpose of using acid:

❑Tightening gut for a specific health issue?

- ✓**Use organic acid**

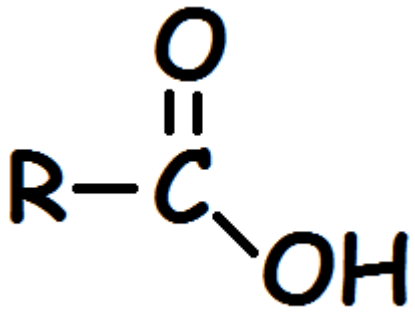
❑Lowering pH for water treatment or solubilizing minerals?

- ✓**Use Inorganic acid**
- ✓**Use organic acid for weak alkalinity**

Using acids in water

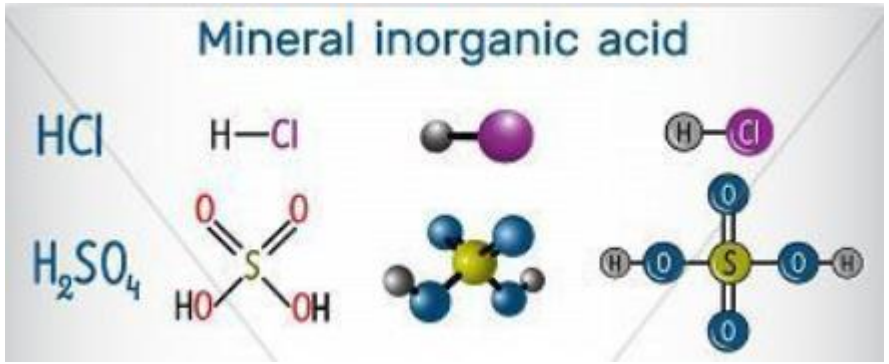
Organic acids (for gut health)

- Citric acid
- Acetic acid
- Propionic acid
- Formic acid
- Lactic acid
- Peracetic acid/PAA: an organic chemical compound (mixture of Acetic Acid and Hydrogen Peroxide)



Inorganic acids (for lowering pH)

- Phosphoric acid
- Sulphuric acid
- Hydrochloric acid
- Sodium bisulfate
- Acidified copper sulfate



Overuse of organic acids

Photo credit: Proxy-Clean Products

Using inorganic acids for a long period to lower pH

- Try to use chloride-free acids
- Try to use equipment-friendly acids such as phosphoric-based products

Photo credit: Proxy-Clean

Water disinfection technologies

- UV light
- Ozone
- Chlorine
- Chlorine dioxide
- Hydrogen peroxide
- Peracetic acid
- Cold plasma

Photo credit: Proxy-Clean

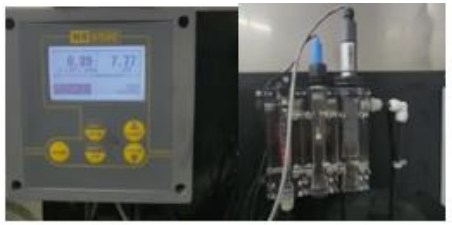
Photo credit: Dr. Susan Watkins

Automated water treatment system

Source water

Storage tank

Filter



pH monitoring system

Auto-dosing system to inject the disinfectant

Mixing tank

Back washable Glass media filter

Header tank

Poultry house

Check water treatment system

Routine practice

- Hearing the pump is clicking and assuming the treatment system is working well

Strategic practice

- ✓Test disinfectant residual at the beginning of the water line AND the end of the water line
- ✓Measure and document!
- ✓Data is vital for your future plans!

Hydrogen peroxide residual

Target end-of-the-line concentration: 75 to 150 ppm
Then what should be the starting point?

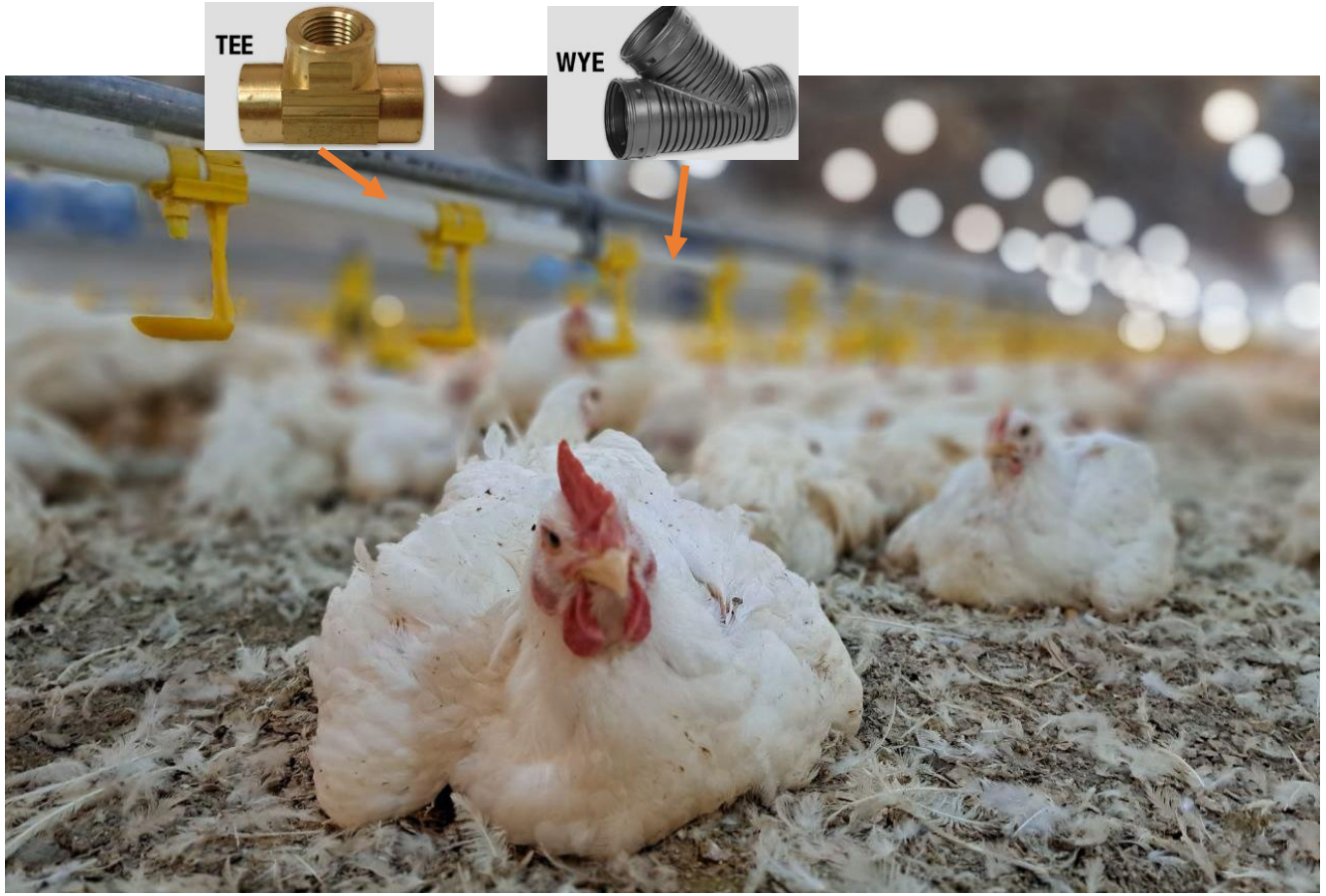
Hydrogen Peroxide test strips 0-400 ppm ($35)

Titration-type Hydrogen Peroxide test kit

Measures up to 1000 ppm

Where is the critical point in my drinker line?

- Use the inspection camera AND oxidizer residual test strips together!



Chlorine dioxide residual test

Target Chlorine Dioxide levels:

- **Total: up to 5ppm**
- **Free: 0.5 to 0.8 ppm**

Total & Free chlorine strips ($28)

Total & Free chlorine kit ($190)

Only tests Total chlorine ($23)

Chlorine residual and ORP test

Measure ALL of these:

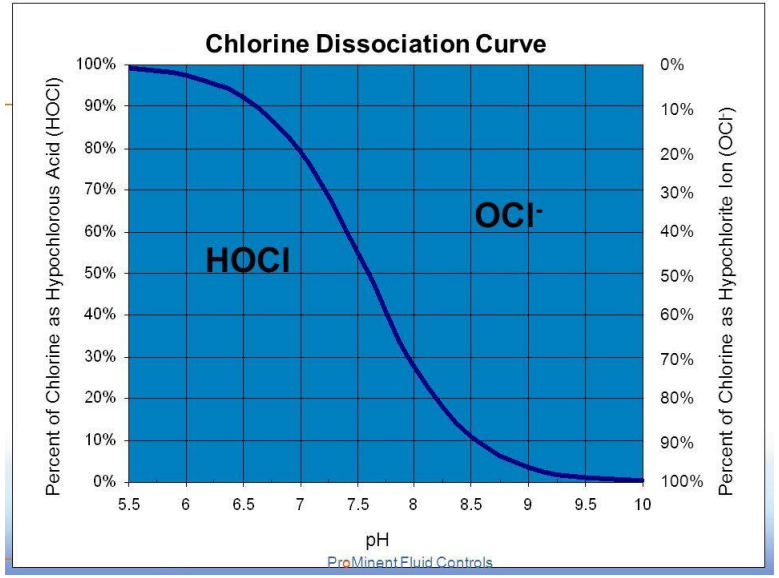
- Total Chlorine: 8-10ppm
- Free Chlorine: 3-6ppm
- ORP: more than 650 mV

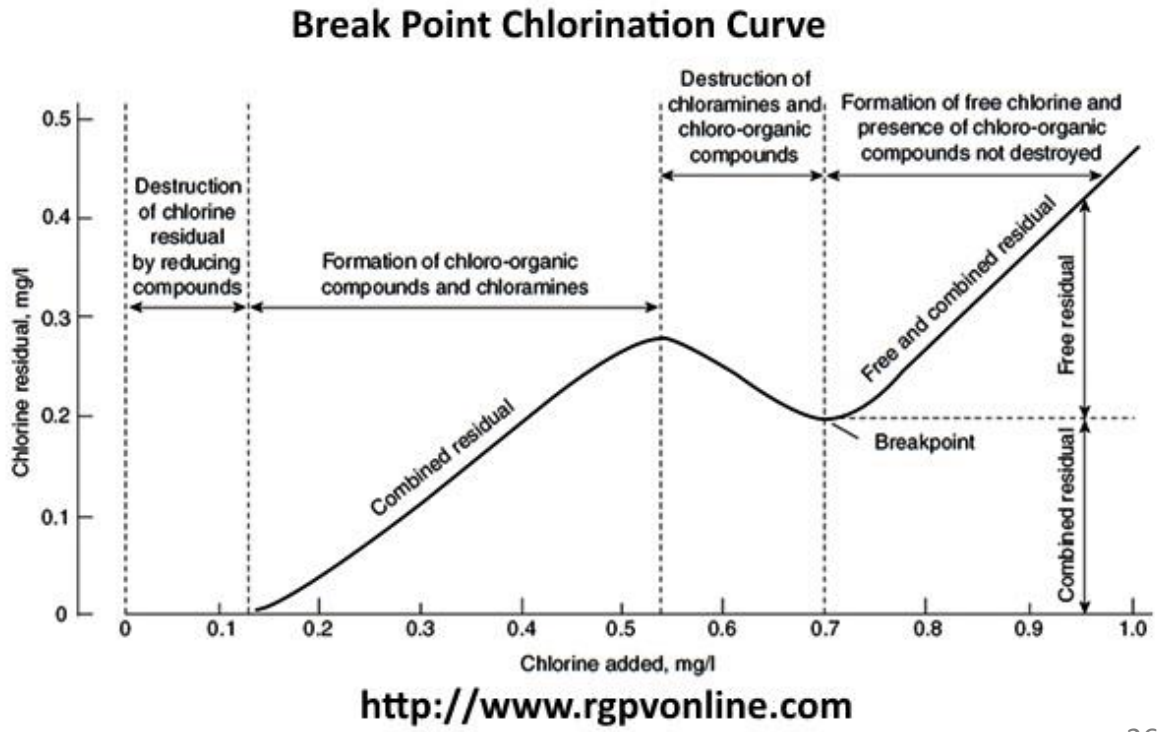
pH & ORP meter ($245)

Only tests Free chlorine ($12)

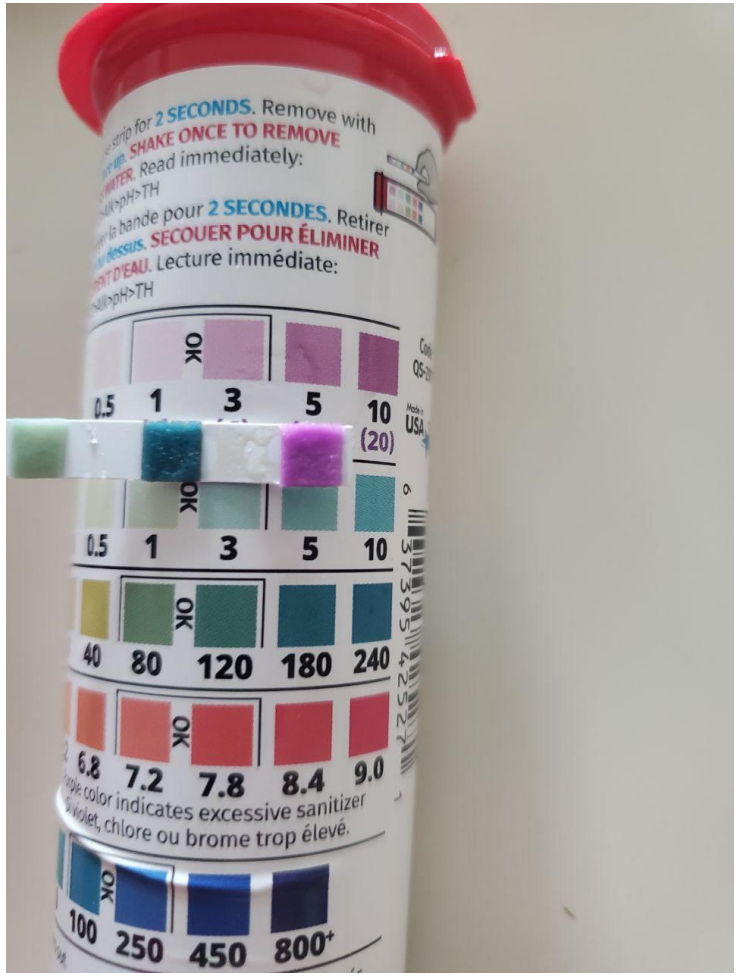
Why should you measure Total Chlorine, Free Chlorine and ORP?

- Total Chlorine = Combined Chlorine with junks + Free Chlorine
  - Total Chlorine = 8 - 10ppm
- Free Chlorine = **HOCl** + OCl-
- Free Chlorine = **Strong guy** + Weak guy
  - Free Chlorine: 3 - 6ppm
- ORP shows the strong guy!
  - ORP: above 650 mV





Which drinker line is cleaner?



Concentration of free chlorine at the beginning and end of the line

Let’s do an exercise!

Step 1

Chlorine applied: 2mg/l

FAC: 0mg/l

TC: 1.2 mg/l

Step 2

Chlorine applied: 3.2mg/l

FAC: 0.2mg/l

TC: 2 mg/l

Step 3

Chlorine applied: 3.8mg/l

FAC: 1mg/l

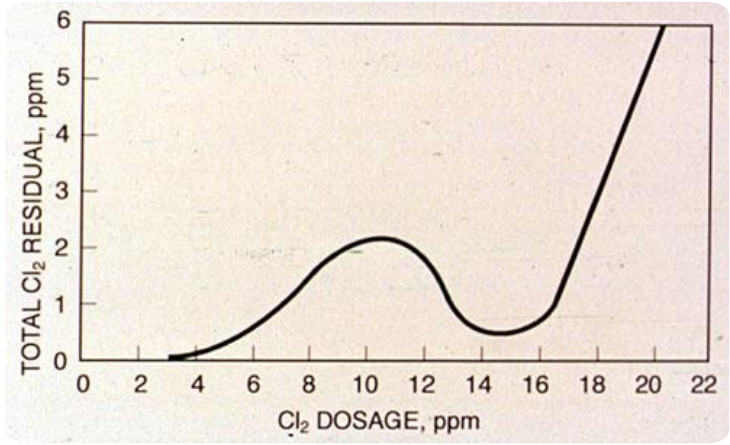
TC: 1.8 mg/l

Step 4

Chlorine applied: 4.2mg/l

FAC: 1.6mg/l

TC: 1.8mg/l



At Breakpoint:

- TC and FAC are close together
- TC does not change anymore

FAC: Free Available Chlorine

TC: Total Chlorine

Chlorine is a good sanitizer ONLY IF:

- Water pH is between 4 and 7
- Low organic matter in water
- Water temperature above 19°C
- Low water turbidity (less cloudy)
- Fresh product and good storage
- Enough exposure time
  - CT = (Concentration of free chlorine × Time) = 8
- Remember, always measure **Total chlorine** AND **Free chlorine** AND **water ORP**

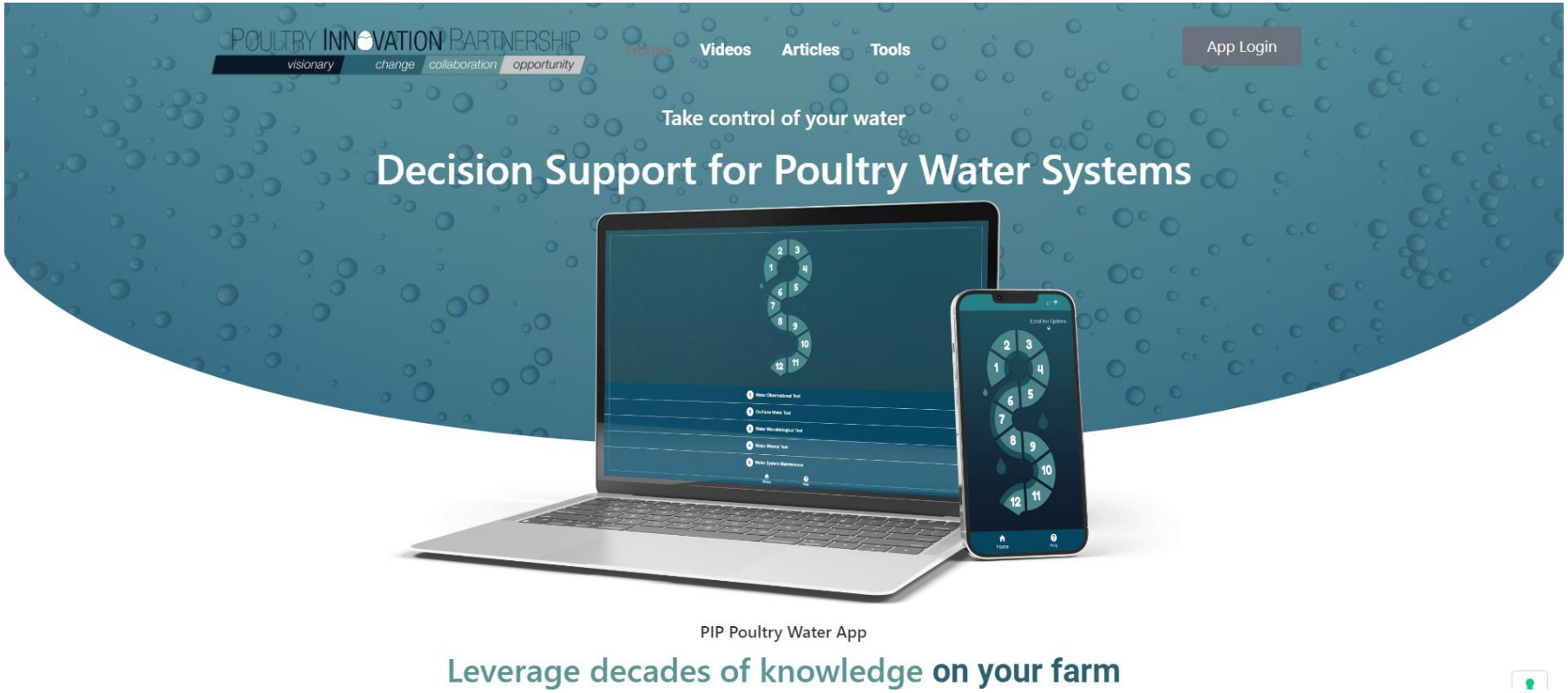
What does “enough exposure time” mean? A measure to gauge the killing power

Free chlorine residual (ppm)	Contact time (min)	CT (Concentration × Time)
0.2	40	8
0.4	20	8
1	8	8
2	4	8
4	2	8
8	1	8

Photo credit: Josh Wipf

PIP Poultry Water App

pippoultrywaterapp.com



PIP Poultry Water App

Always start with the right questions!

1. Water Observational Test
2. On-Farm Water Test
3. Water Microbiological Test
4. Water Mineral Test
5. Water System Maintenance
6. Water Sampling Protocol
7. Microbial Treatment and Water Sanitation Protocol
8. Waterline Cleaning Protocol Between and During Flocks
9. Biofilm Cleaning Protocol
10. On-farm Water Test Tools
11. Vaccination Through Drinking Water
12. Well Shock Chlorination

Information needed before using the app

Observational test

- Water color, taste, odor, water stains on the surfaces
- Collect water sample in two glasses

On-farm tests

- pH TDS
- EC ORP

Water microbiology

Water minerals

Managerial practices on the maintenance and operation of water system

What should I expect from the water app?

Water tests to request from the lab

- Does your water leave behind any residue (stains, scale, film) in any of the following colors?
  - Clear
  - Brown
  - ✓ Pink
  - White
  - ✓ Reddish-brown
  - Gray
  - Yellow
  - Black
  - Blue-green

Observational Water Test
Results and Recommendations

Outcome	Action
Based on your answers to the water residuals questions, you might need a specific microbial test on your water.	Request Pseudomonas analysis. If your water is contaminated, then follow the instructions in the water sanitation section of the app.

On-Farm Tests
Results and Recommendations

Outcome	Action
Your water EC level is above the acceptable level. To convert	Try to use reverse osmosis to treat the water.
measurements of electrical conductivity (EC) to total dissolved solids (TDS), or vice versa, use the equations below:	

What should I expect from the water app?

- On-farm water test tool recommendations
- How to interpret the on-farm tests results

What should I expect from the water app?

Interpret your water lab test results

8. What is the level of sulfates in your water?

- Less than 40 mg/l
- Between 40 and 250 mg/l
- Above 250 mg/l
- Not Sure

Water Mineral Test
Results and Recommendations

Outcome	Action
Your water's sulfate level is above the acceptable level.	The best thing to do is shock chlorination of the well (refer to the
A rotten egg odor represents the presence of hydrogen sulfide-producing bacteria. High concentrations of sulfate can have a laxative effect in birds.	"Well Shock Chlorination" section in the app) and then treating the water with hydrogen peroxide; filter it out and clean it up. Hydrogen peroxide is much better for treating sulfur than other sanitizers

What should I expect from the water app?

Information on water system maintenance

- ✓ Proper pump and piping size
- ✓ Water storage maintenance
- ✓ Water filters maintenance
- ✓ Standpipes maintenance
- ✓ Nipple drinker maintenance
- ✓ Water flow rate in water lines
- ✓ Water pressure regulator maintenance
- ✓ Water lines used during brooding

Photo credit: Proxy-Clean

What should I expect from the water app?

Water treatment protocols

6. Water Sampling Protocol
7. Microbial Treatment and Water Sanitation Protocol
8. Waterline Cleaning Protocol Between and During Flocks
9. Biofilm Cleaning Protocol
10. On-farm Water Test Tools
11. Vaccination Through Drinking Water
12. Well Shock Chlorination

Step 5. Shut the regulator's valves off when the cleaning product filled into the system. Leave the product in the water

pippoultrywaterapp.com

Take home massages

Understand your drinking water challenges

Develop a written plan based on the recommended Actions and Protocols

Implement the plan using the commercially available products

Monitor the treatment system using on-farm tools!

THANK YOU FOR YOUR ATTENTION