BARN WATER SYSTEM MANAGEMENT PROGRAM

TechMix®

Keeping animals drinking, eating & producing.™

What do you want your pigs drinking?

OR

This…

This…

Courtesy of Neogen

Source: https://www.nationalhogfarmer.com/hog-nutrition/water-source-placement-does-not-impact-energy-nutrient-digestibility

PROGRAM GOALS

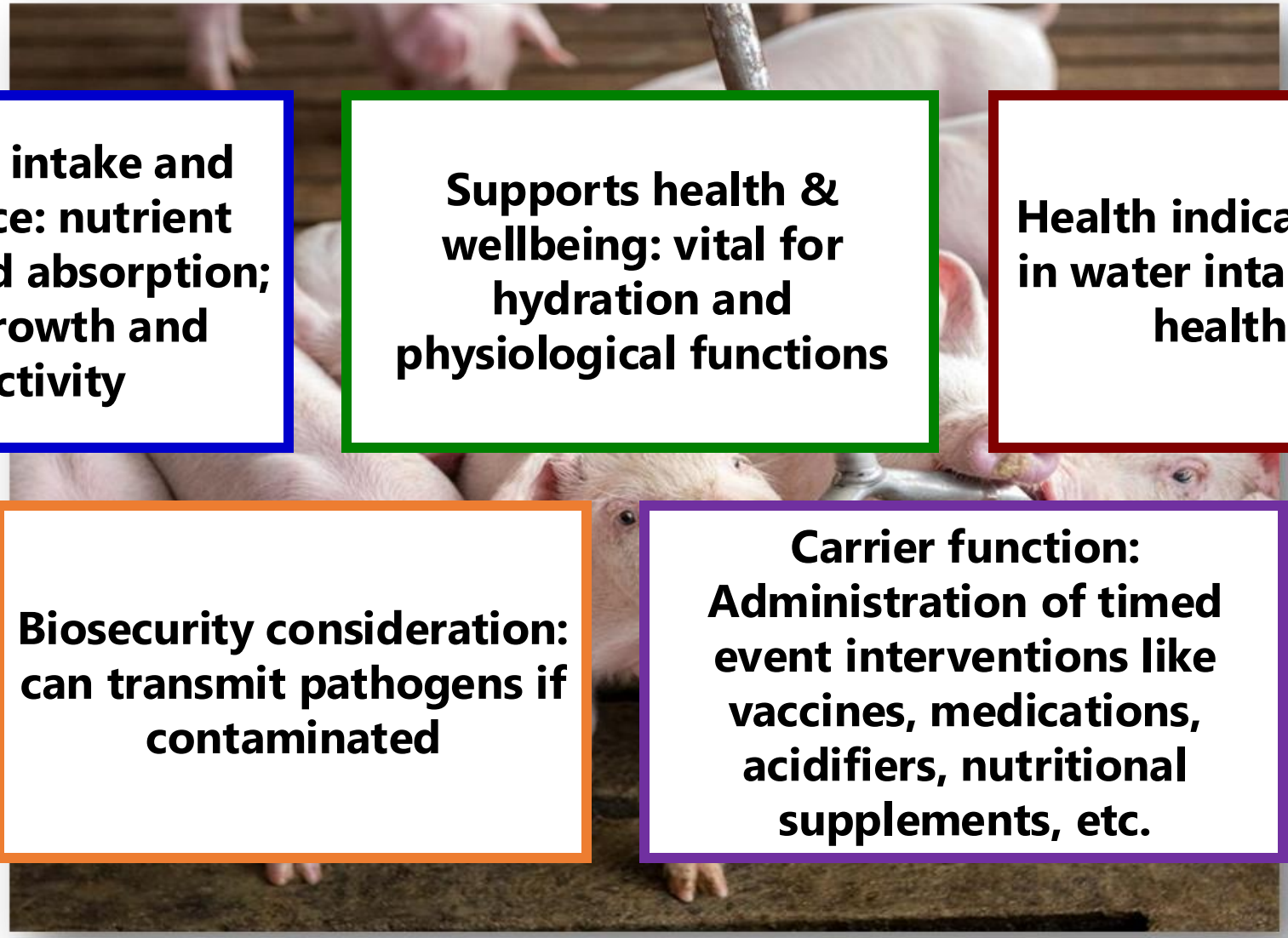
Develop and implement	A proactive approach to cleaning, sanitizing, and maintenance of the barn water system
Ensure	That these specific practices are executed consistently according to a regular, structured schedule, rather than reactively or sporadically
Improve	Pig health, performance, and biosecurity through better barn water system management

Would you drink the same water that you make available to your pigs?

I. INTRODUCTION

WATER: THE UNSEEN FACTOR IMPACTING PERFORMANCE, HEALTH, AND PROFITS

WATER IS CRITICAL FOR PIGS



Drives feed intake and performance: nutrient transport and absorption; impacts growth and productivity

Supports health & wellbeing: vital for hydration and physiological functions

Health indicator: changes in water intake can signal health issues

Biosecurity consideration: can transmit pathogens if contaminated

Carrier function: Administration of timed event interventions like vaccines, medications, acidifiers, nutritional supplements, etc.

Picture source: https://www.nationalhogfarmer.com/hog-nutrition/water-source-placement-does-not-impact-energy-nutrient-digestibility

WATER IS CRITICAL FOR PIGS

Attributes that affect water quality, intake and performance:

Sensory Attributes (Organoleptic)

- Odor and taste are critical for ensuring palatability and encouraging intake

Physicochemical Properties

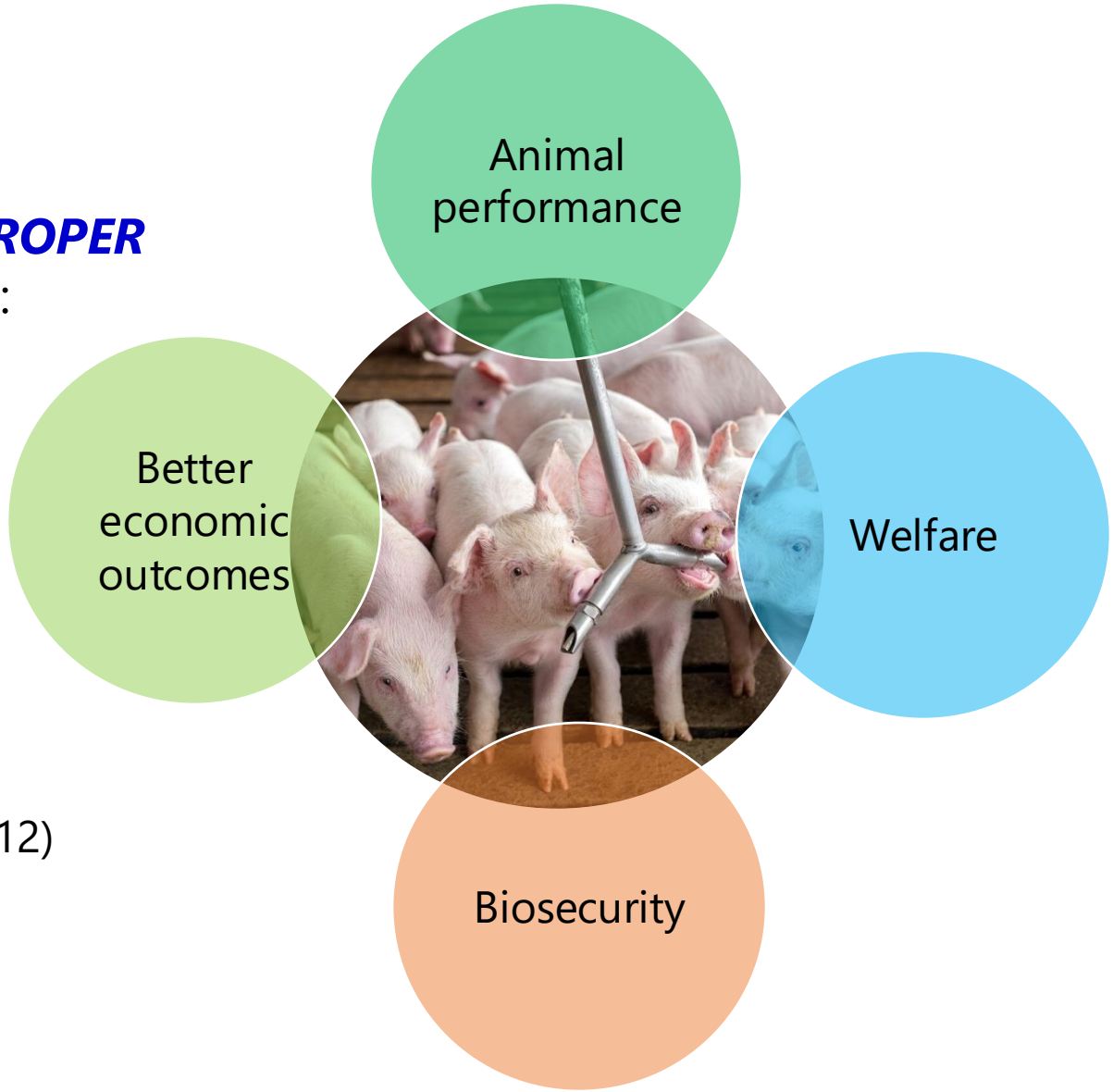
- ***Optimal pH range to avoid digestive or health issues: 3.8-5.5.***
- Total Dissolved Solids (TDS): Measures overall water purity
- Hardness: Mineral content (e.g., calcium, magnesium)

Chemical Composition

- Toxic compounds: heavy metals, chemicals, etc.
- Excess Minerals: nitrates, sodium, or sulfates
- Biological Contaminants: Bacteria, fungi, algae, and viruses pose serious health risks.

WATER IS CRITICAL FOR PIGS

Along with feed, air, and animal husbandry, ***PROPER WATER QUALITY AND QUANTITY*** promotes:



- Newborn piglet: Over 80% water
- Finished pig: 53% water
- A 10% loss of body water can result in death

(Maynard et al., 1979; Patience 2012)

Picture source: https://www.nationalhogfarmer.com/hog-nutrition/water-source-placement-does-not-impact-energy-nutrient-digestibility

IMPORTANCE OF WATER QUALITY

Water is essential to optimize pig health, performance, and economic outcomes

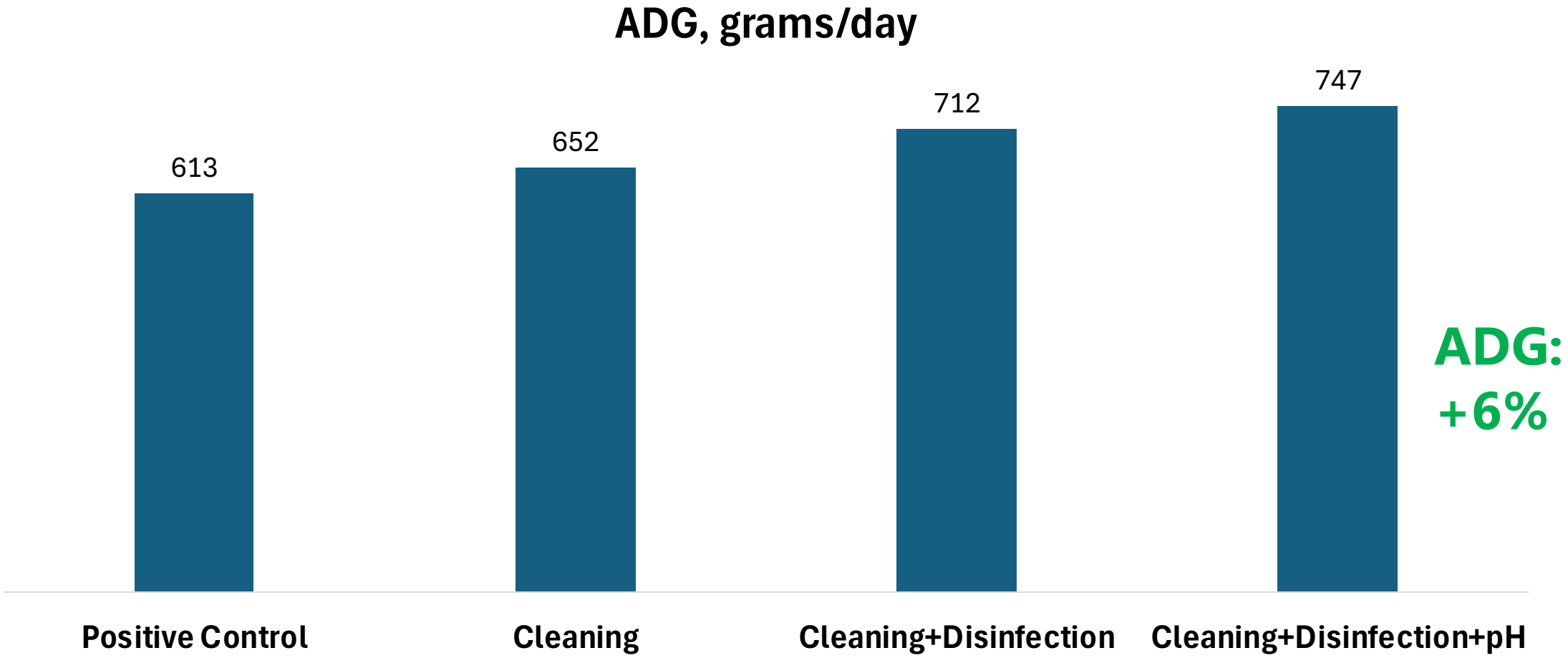
Optimizing water availability (quantity and quality) from the source and at the drinker takes center stage

Complex interactions of water contaminants with products being administered via the drinking water can prevent proper dosing, decrease effectiveness or affect the elements of the water syste, due to:

Synergistic effects	Additive effects	Synergistic effects

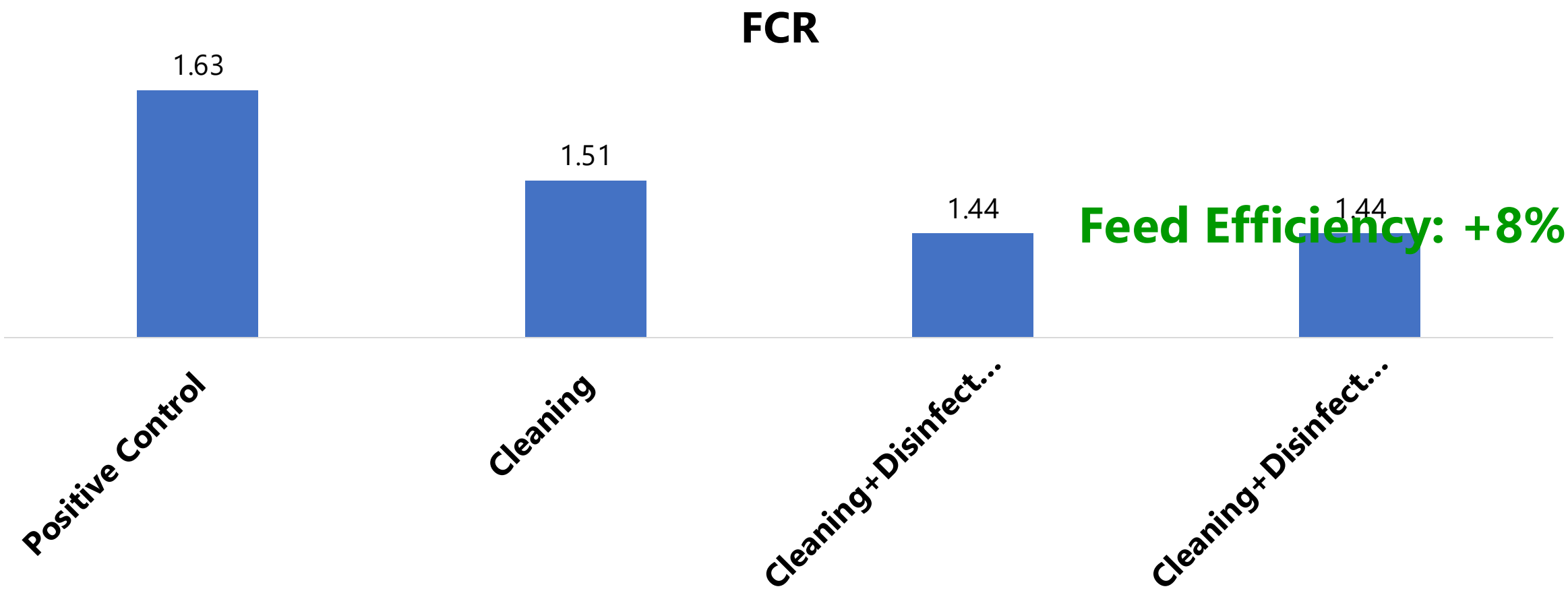
Proper management, cleaning and disinfection of the Water Delivery System is critical

IMPACT OF WATER SYSTEM CLEANING AND SANITIZATION ON PIG PERFORMANCE



Pitkin et al. 2012

IMPACT OF WATER SYSTEM CLEANING AND SANITIZATION ON PIG PERFORMANCE



Pitkin et al. 2012

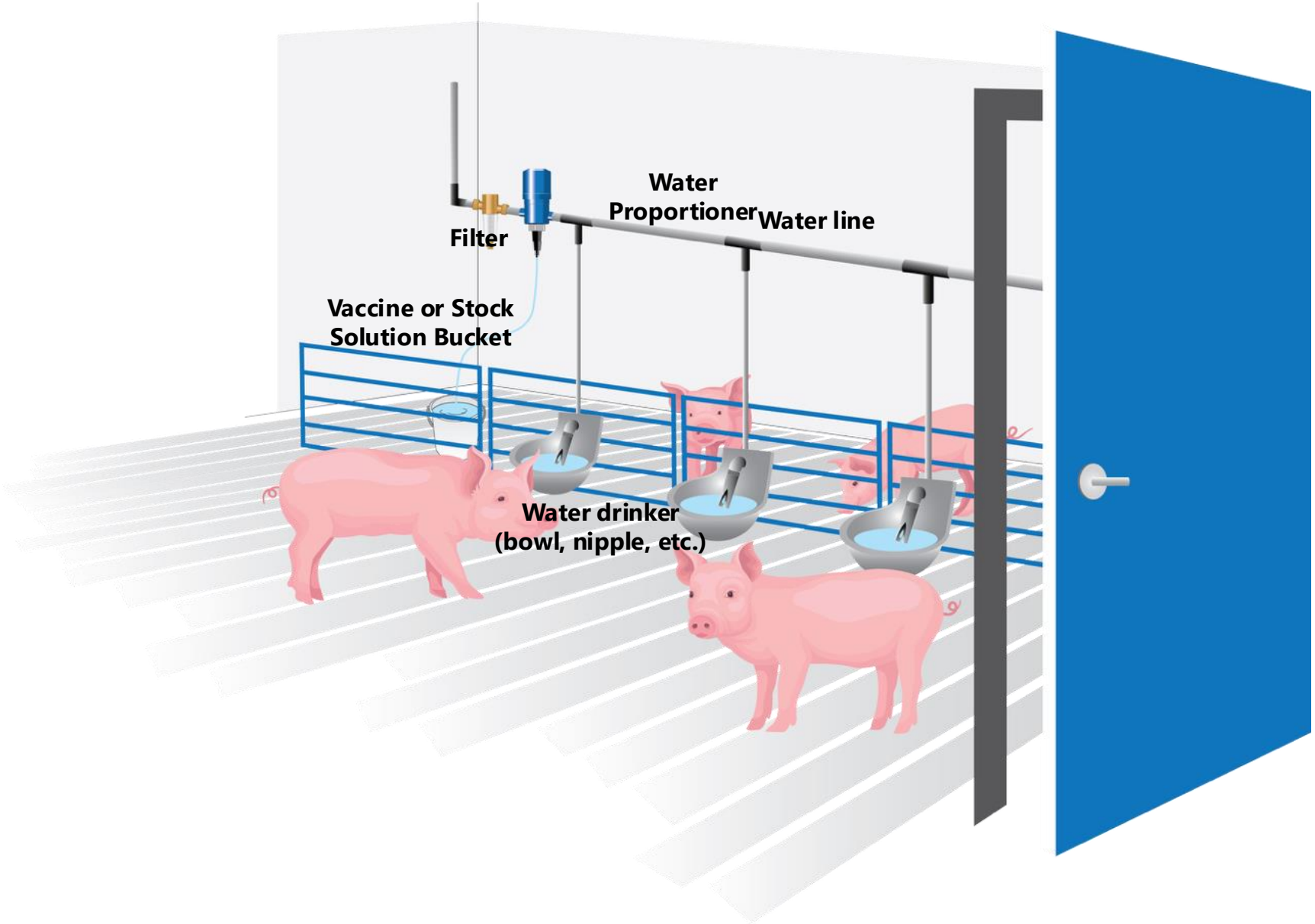
II. BARN WATER SYSTEM MANAGEMENT

EVERY PART COUNTS: WHY UNDERSTANDING YOUR WATER SYSTEM PREVENTS PROFIT LEAKS

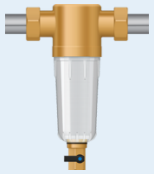
What does your ***Barn Water System*** consist of

Source: Hogslat

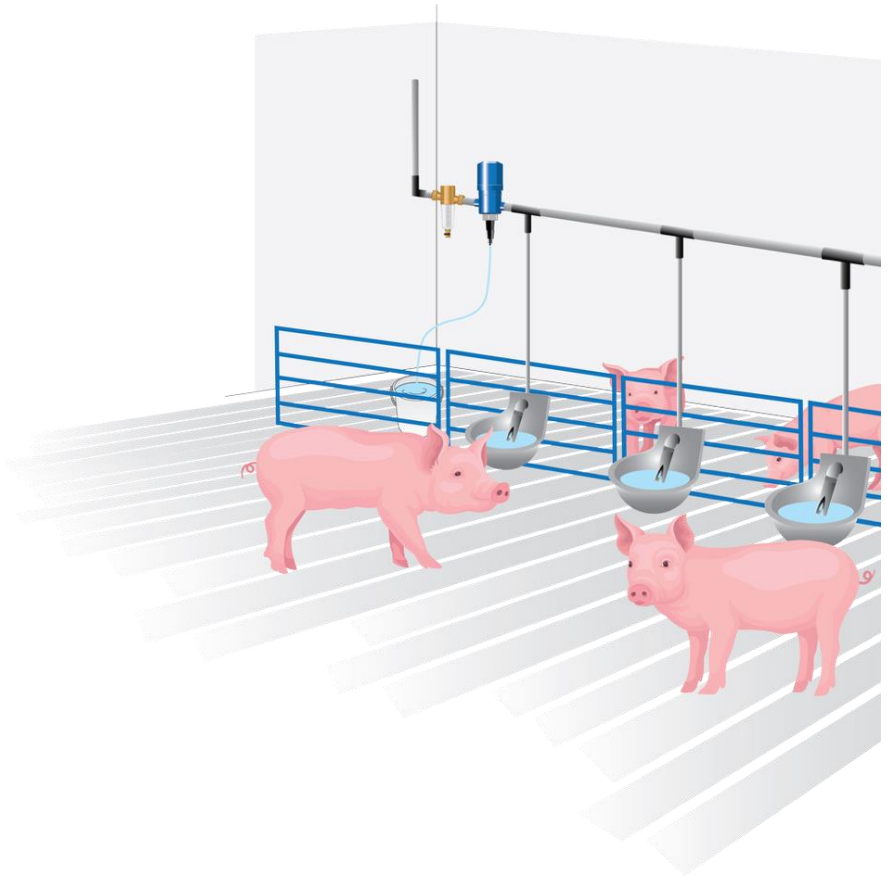
THE BARN WATER SYSTEM: OVERVIEW OF COMPONENTS



YOUR BARN WATER SYSTEM: EVERY COMPONENT A KEY TO PROFIT OR LOSS

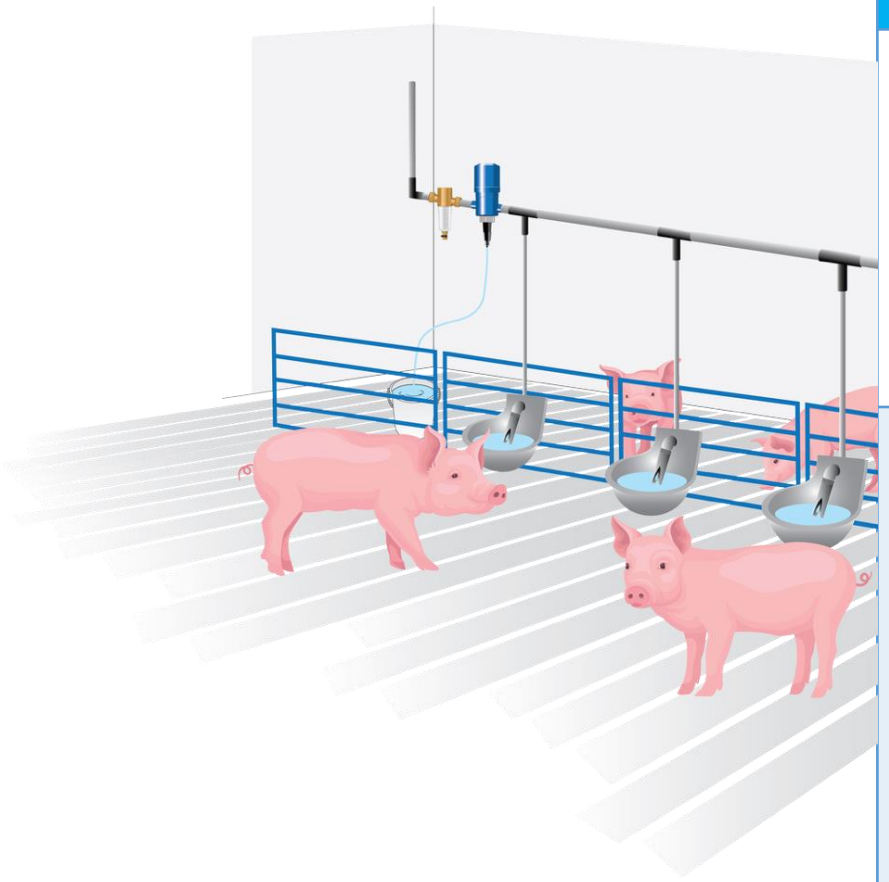
Component	Function	Management
Water Filter 	• Removal of contaminants	**Contaminant buildup affects water flow rate, could be a hidden bottleneck to performance** • Daily checkup ensures optimal water flow and quality • Replace if necessary
Water Proportioner (Medicator) 	• Injection/dosing of time-event interventions: medications, vaccines, nutritional supplements, and other products. • Common injection rate 1:128	**Lack of cleanliness and maintenance impact proper dosing and equipment lifetime** • Rinsing, cleaning and disinfection after each use • Ensure proper dosing: Internal components inspection, lubrication and replacement (if needed): O-rings, ceramic sleeves • Calibration is key for proper dosing
Stock solution container (bucket) 	• Stock solution reservoir	**Contaminated buckets dilute effectiveness, costing you performance and money.** • Ensure product effectiveness: rinsing and cleaning after each use is critical • The dedicated bucket advantage: Use a dedicated bucket for each product type (vaccine, antibiotics, etc.), or bucket liners at minimum

YOUR BARN WATER SYSTEM: EVERY COMPONENT A KEY TO PROFIT OR LOSS



Component	Function	Management
Water line 	The guts of the water system The material they are made of impacts sediment build up and biofilm growth	**Leaks, residue build up and clogging affect water availability for pigs** • Maintenance, flushing cleaning and sanitizing schedule is critical
Water drinker 	Point of water and product delivery for pigs Incorrect set up, flow rate, affect water consumption	**Leaks and clogging impact water wastage and availability for pigs** • Daily checkups and maintenance are necessary • Periodic flushing, cleaning and sanitizing is critical

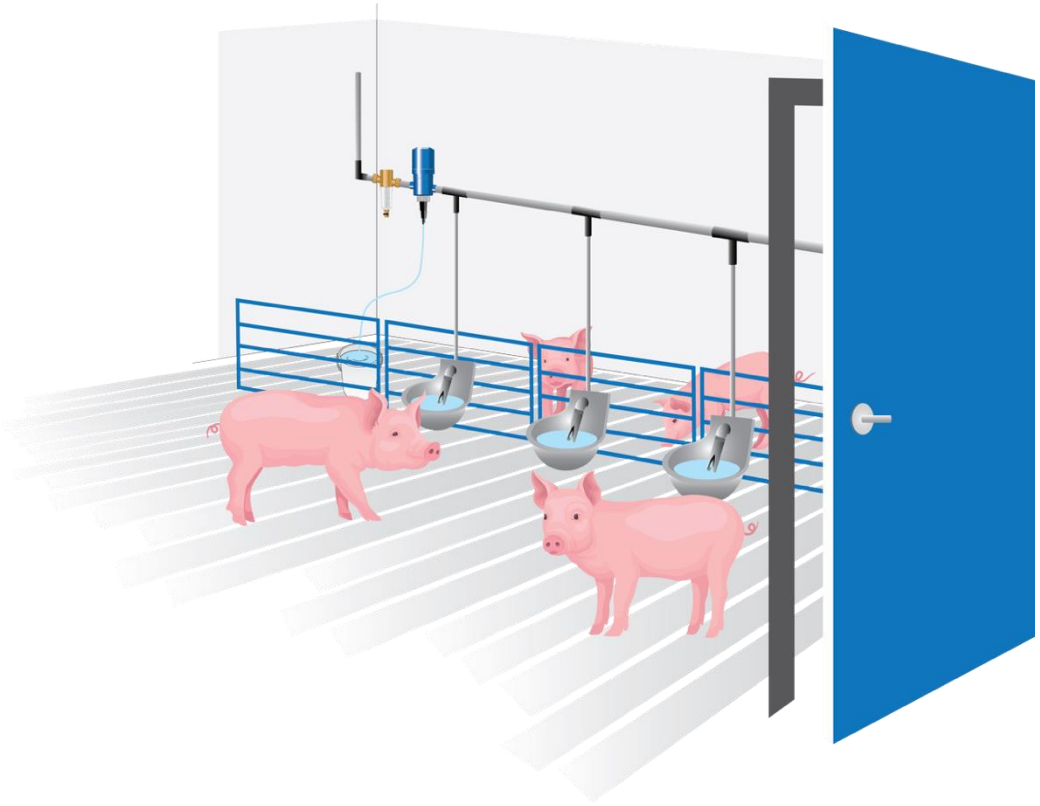
YOUR BARN WATER SYSTEM: EVERY COMPONENT A KEY TO PROFIT OR LOSS



Component	Function	Management
Pressure regulator 	Delivers consistent flow, minimizes waste, and optimizes pressure at the drinker.	**Inadequate pressure affects water consumption and wastage** Monitor functionality daily, adjust pressure according to age of the pigs
Agitator pump 	Helps maintain products in solution to ensure proper dosing.	**Proper mixing of the stock solution ensures accurate dosing** • Inspect, clean, and lubricate components regularly to avoid clogging, breakdowns and mechanical failure. • Clean and maintain per user's manual.

EACH ELEMENT OF YOUR BARN WATER SYSTEM IMPACTS PIG PERFORMANCE

Regular maintenance, cleaning and disinfection isn't a chore; it's a strategic investment!

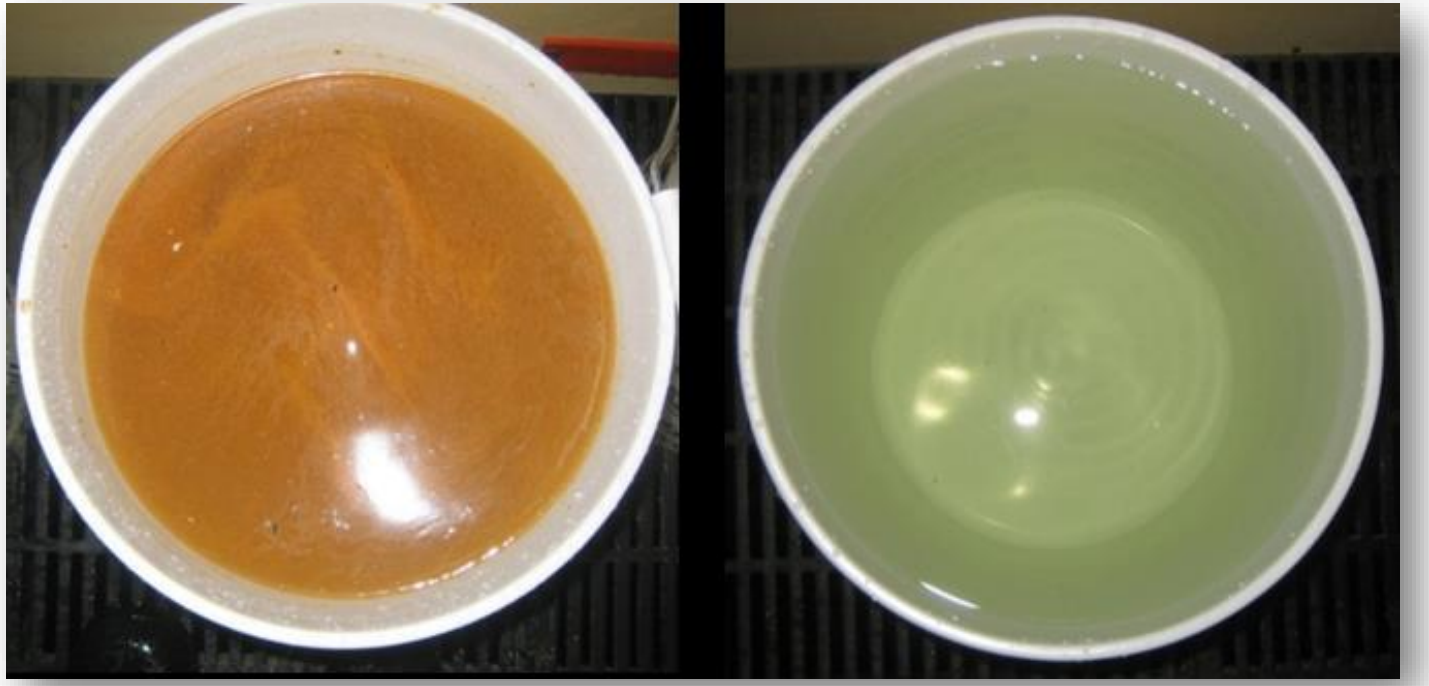


It directly impacts:

- **Livability**
- **Performance**
- **Bottom line**

III. BARN WATER SYSTEM MANAGEMENT: CLEANING AND DISINFECTION

DON'T LET SLUDGE WEIGH YOUR PIGS DOWN!



First 5 gallons flushed after overnight soak

Last 5 gallons flushed after overnight soak

Source: Neogen

WATER SYSTEM CLEANING AND DISINFECTION VERSUS ACIDIFICATION

CLEANING AND DISINFECTION

Descaling

Scale: dirt, mineral deposits, and product residue build up serves as point of attachment for biofilms, reduce water flow and system efficiency

Biofilm removal

Biofilm: Microorganisms present in water attach to the inside of water lines and produce a protective polymer matrix (slime). Increases the risk of disease, plugs water lines.

Pathogen removal

Disease causing or biofilm growing microorganisms: E. coli, Salmonella, Pseudomonas, Fungi

ACIDIFICATION

Water palatability

Encourages water consumption

Prebiotic effect

Gut health and nutrient digestion

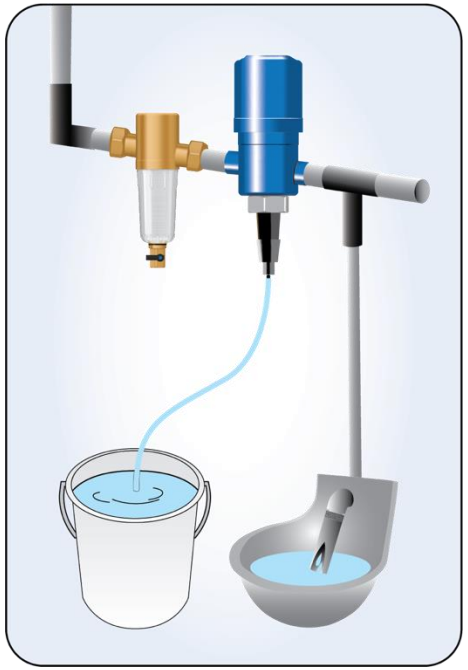
Enzymatic activity, digestive processes

Supports

Efficacy of cleaning and disinfection processes

BARN WATER SYSTEM MANAGEMENT: PREVENTATIVE CLEANING AND MAINTENANCE

DAILY CHECKUPS



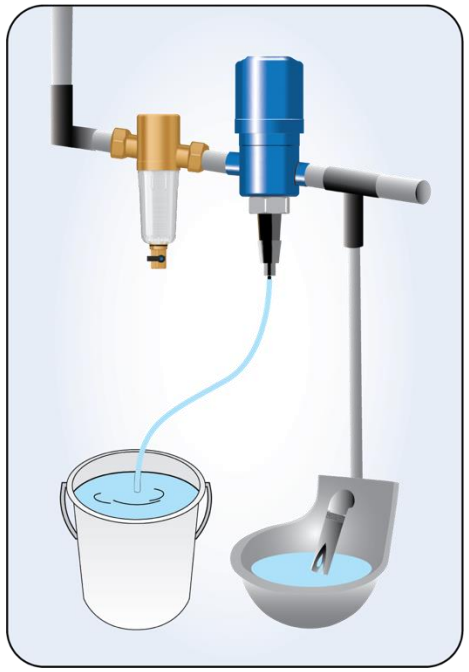
- **Filter:** Drain and rinse if there is sediment buildup
- **Water drinkers and nipples:** Clean or replace if reduced flow or no flow at all
- **Water lines:** Repair any malfunctioning or breaks immediately

When administering products:

- **Water proportioner (medicator)*:** Inspect for proper injection of stock solution
  - Common problems: clicking-not injecting, clicking-leaking, not clicking at all
  - Agitator pump: ensure proper functioning, if using one
- **Stock solution buckets:** rinse before making new stock solution daily
  - Use dedicated buckets (or replace liners) if different products are being administered

BARN WATER SYSTEM MANAGEMENT: PREVENTATIVE CLEANING AND MAINTENANCE

AFTER EACH USE

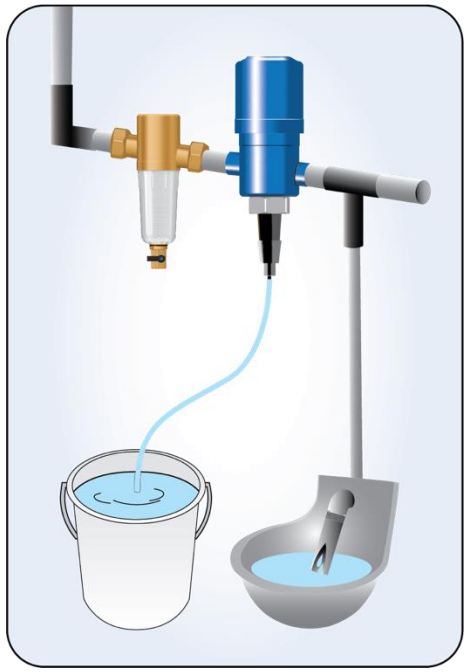


- **Rinse** the stock solution bucket and run a gallon of fresh water through the medicator
- **Clean** the water system with a product that is safe for pig consumption. Always follow manufacturer's directions
- **Rinse** the stock solution bucket and run a gallon of fresh water through the medicator
- **Clean and maintain the agitator pump per user's manual.**

***Never let the medicator run dry to avoid damage to parts.**

BARN WATER SYSTEM MANAGEMENT: PREVENTATIVE CLEANING AND MAINTENANCE

BETWEEN TURNS



1. **Flush** the water system to reduce the amount of residue in the system.
2. **Clean and sanitize** using a terminal water line cleaner and disinfectant (e.g. peracetic acid, hydrogen peroxide, etc.)
   - ➢ Prime the water lines
   - ➢ Let product sit in the water system, always follow manufacturer's directions
3. **Flush** the system with clean water
4. **Ensure** all water bowls/nipples function properly
5. **Clean** medicator as directed by manufacturer
   - ➢ Replace any parts showing wear and tear:
     - ✓ O-rings on the plunger
     - ✓ Porcelain sleeves
   - ➢ Lubricate and reassemble
6. **Calibrate** the medicator

WATER SYSTEM CLEANING AND DISINFECTION: PRODUCTS

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Key considerations for choosing sanitizers:

Primary Factor: Efficacy in inactivating pathogens (bacteria and viruses)

Secondary Factors: Application method, cost, and safety

Expert Guidance: Technical advisors, veterinarians, or sales representatives for recommendations

The choice of a sanitizer must balance efficacy with practicality, guided by reliable data and expert advice

WATER SYSTEM CLEANING AND DISINFECTION BETWEEN TURNS

DESCALING PROTOCOL

1. Flush water lines with clean water
2. Remove nipples and open draining/purging valves to drain water, replace and close.
3. Apply the descaling solution by triggering all drinkers to distribute the solution.
   - Select a product that will provide a target pH between 4–5 for effective descaling.
     A higher pH is ineffective, and a lower pH may corrode equipment.
   - Consult with an expert and always follow manufacturer's directions.
4. Let the solution sit for the time recommended by the manufacturer to break down biofilms and mineral deposits.
5. Flush all lines thoroughly with fresh water
6. Activate drinkers to ensure complete cleaning

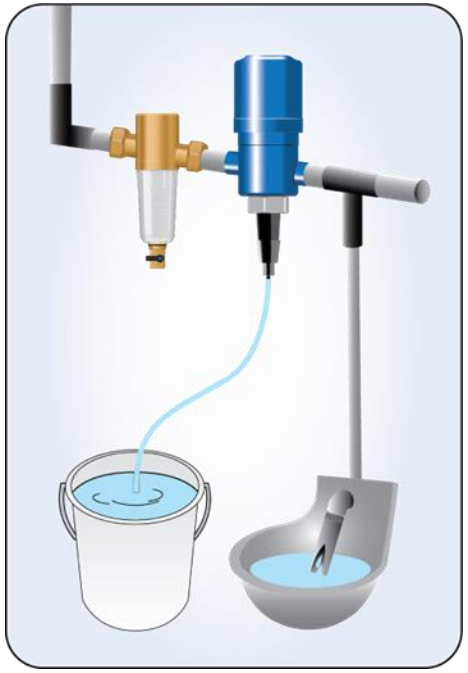
WATER SYSTEM CLEANING AND DISINFECTION WHEN BARN IS EMPTY

DISINFECTION PROTOCOL

1. Open draining/purging valves and remove water nipples
2. Flush water lines to remove loose debris
3. Inject disinfectant through the medicator, follow manufacturer's recommendations.
4. Let the solution circulate, then resecure the water nipples and close the draining/purging valves. Leave one valve open overnight to manage pressure buildup
5. Activate the nipples or empty and refill the pans: Ensure solution distribution through the system
6. Let the product sit in the water lines for according to manufacturer's recommendations
7. Flush thoroughly to remove any product residues or loos debris
8. Confirm system function by activating water nipples and ensure water is readily available for the incoming group of pigs

IV. WATER-BASED PRODUCT ADMINISTRATION: BENEFITS AND CONSIDERATIONS

WHY PRODUCT ADMINISTRATION THROUGH WATER MATTERS



Benefits:

- Efficient group administration method
- Reduces handling stress for pigs
- Ensures timely delivery of event-driven interventions (e.g., weaning, health challenges, heat stress, etc.):
  - Targeted nutritional support to mitigate nutrient disruption, oxidative stress, support the immune system and overcome dehydration
  - Vaccines
  - Antibiotics
  - Acidifiers

Key Considerations:

- Water quality affects product effectiveness and dosage accuracy depends on proper calibration of the medicator and product mixing.
- Avoiding contamination or interactions between products is essential for product effectiveness

BEST PRACTICES FOR EFFECTIVE PRODUCT DELIVERY

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🛠️ Preparation:

- Use dedicated stock solution buckets or place liners for each product type
- Flush lines before/after product use

⚙️ Medicator Setup:

- Confirm dosing ratio (commonly 1:128) and proper product injection into the drinking water

🚫 Common Errors:

- ***Running the medicator dry***
- ***Mixing incompatible products. Always test for mixing compatibility between different products and antibiotics or ask your vendor about test they have performed.***
- ***Not priming or triggering the system***

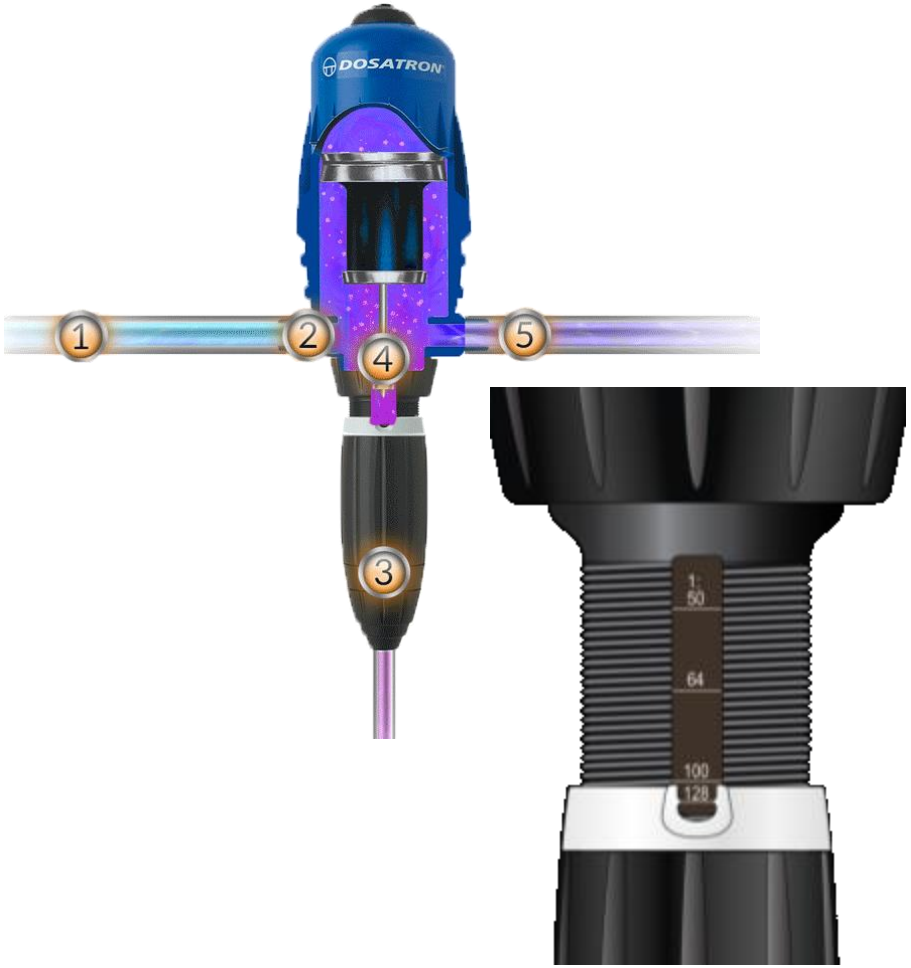
✔ During Administration:

- Make stock solution available for pigs per manufacturer's directions
- Ensure product us being consumed by the animals and maintain records of product administration and production performance

V. ZOOMING IN - THE MEDICATOR: FUNCTIONING, CALIBRATION AND MAINTENANCE

FOCUSING ON THE MEDICATOR

THE KEY COMPONENT FOR PROPER DOSING AND EFFECTIVENESS OF TIME-DRIVEN INTERVENTIONS



- **How it works:**

  1. Water flow
  2. Water enters the Dosatron body
  3. Stock solution/vaccine is pulled up into the water proportioner. Dosing rate is selected here, when applicable.
  4. Stock solution/vaccine mixes with the incoming water
  5. Blended solution is discharged into the water line

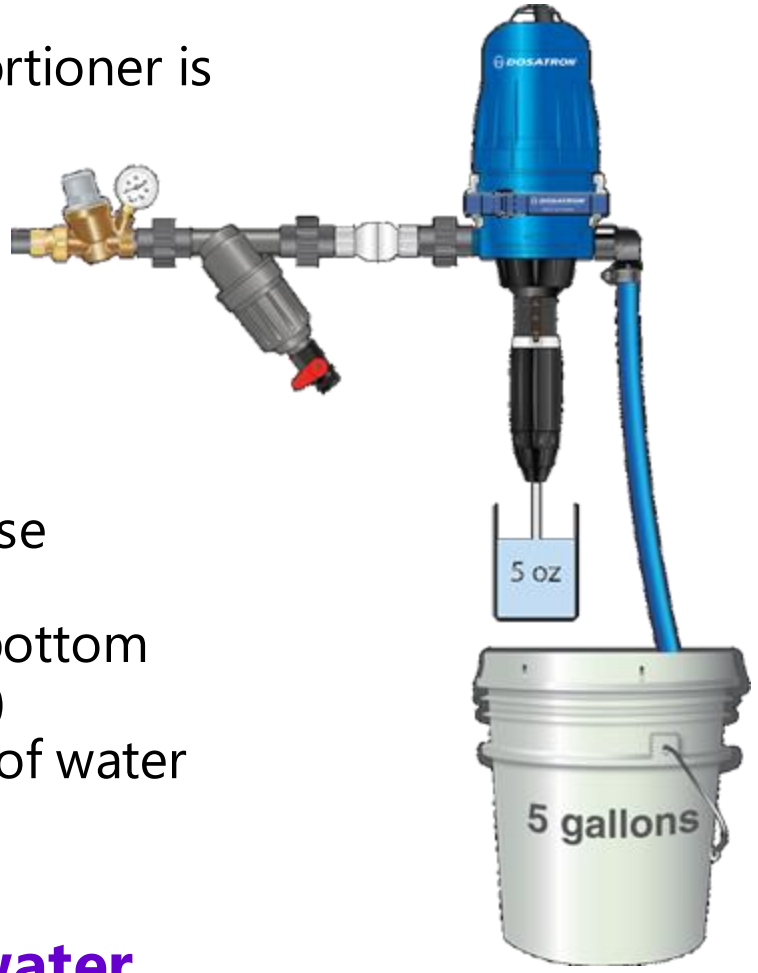
- Proper cleaning, sanitization, and maintenance are key for correct dosing and effectiveness of products delivered through the medicator; less equipment breakdowns and replacement.

https://www.dosatron.com/en-us/how-it-works

CALIBRATION OF THE MEDICATOR

Volumetric Test Procedure

The test will verify that the amount of solution injected by the proportioner is correct



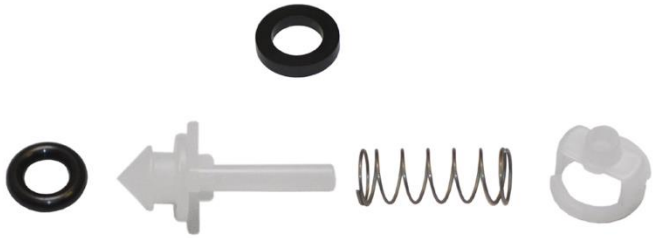
Steps:

1. Set the equipment to 1:128 (1 ounce to 1 gallon)
2. Have a hose on the outbound side of the proportioner
3. Place the garden hose into a 5-gallon bucket
4. Fill a measuring cup with 5 ounces of water
5. Remove the strainer from the bottom of the Dosatron suction hose
6. Insert, and hold, the hose into the measuring cup
7. (**NOTE**: Make sure the hose has an airtight connection onto the bottom barb of the doser. If necessary, cut 1" off the top end of the hose)
8. Turn the Dosatron on slowly, allowing it to suck up the 5 ounces of water from the cup

When the 5-gallon bucket is full, the 5 ounces of water should be gone

Source: Complete guide of best practices for Dosatron injectors. www.dosatron.com

MEDICATOR MAINTENANCE



- Regular wear and tear of mechanical parts occurs through time
- Constant movement, water contaminants, buildup and product harshness deteriorate injection seals
- Cleaning and lubrication ensure proper functioning and longer service life of the proportioner

Source: https://www.hogslat.com/are-your-medicators-ready-for-fall

VI. TROUBLESHOOTING THE DOSATRON MEDICATOR

TROUBLESHOOTING

COMMON ISSUES

1. The injector is making noise but not pulling in the stock solution. Clicking – Nothing moving
2. The injector is forcing water back into the stock solution container. Clicking – Leaking
3. The injector is not making noise or is stopping when the flow rate is low - Not clicking

The first two are the most common. If the medicator is clicking but it's not drawing or it is pushing liquid down into the stock solution container the issue is in the lower stem area, commonly the cause is the **Plunger Seal,** the **Check Valve** or the **Suction Tube**

- **Dosatron DM11F Medicator Troubleshooting Video:** https://www.youtube.com/watch?v=Xw0aY3WfLXk

TROUBLESHOOTING: CLICKING – NOTHING MOVING OR CLICKING-LEAKING

The Plunger Seal

a. Inspect the plunger seal for knicks, grooves, or wear.

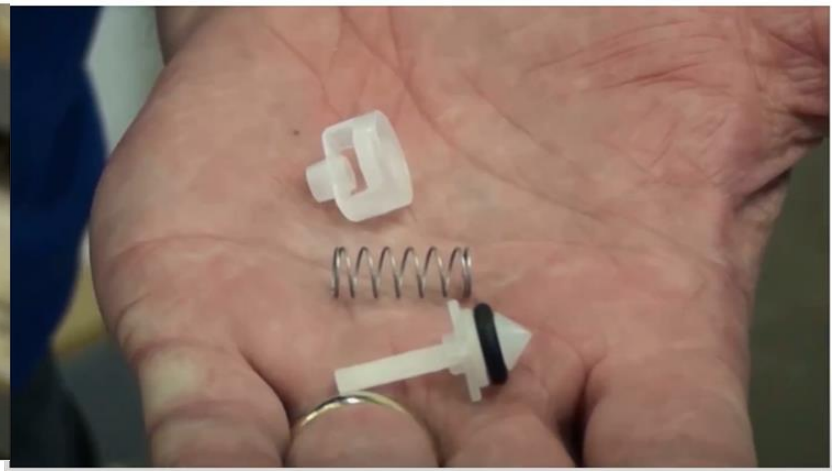
b. You can also test by taking the stem and inserting the plunger and then pulling it out. It should make a pop sound. If not or you see damage, it is definitely time to replace the plunger seal.

TROUBLESHOOTING: CLICKING – NOTHING MOVING OR CLICKING-LEAKING

The Check Valve

a. Unscrew and remove the check valve nut and pull the check valve straight out.
b. Take the parts out, make sure they are not damaged, gummy, sticky, or missing.
c. Clean or replace the parts

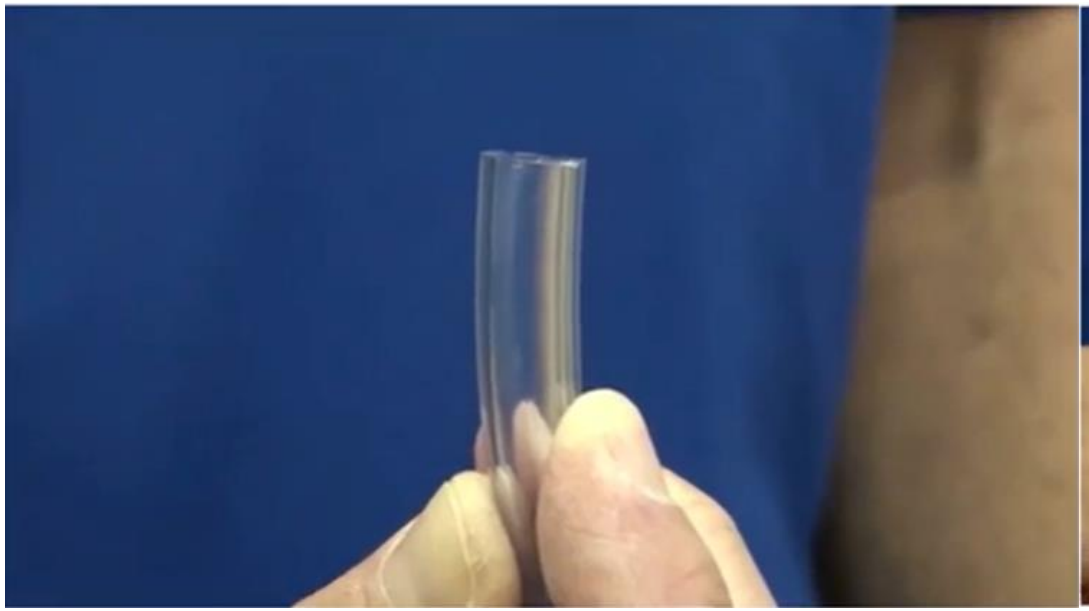




TROUBLESHOOTING: CLICKING – NOTHING MOVING OR CLICKING – LEAKING

The Suction Tube

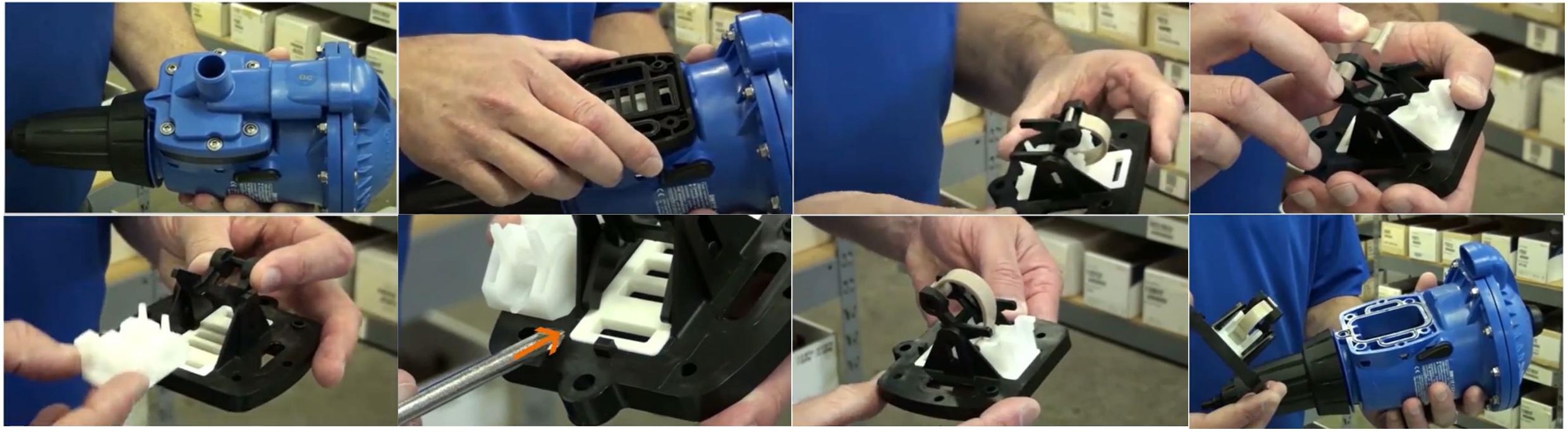
a. Inspect for cracks, holes.
b. If it is rigid or looks old.
c. Cut the damaged section or replace the tube as needed



TROUBLESHOOTING: NOT CLICKING

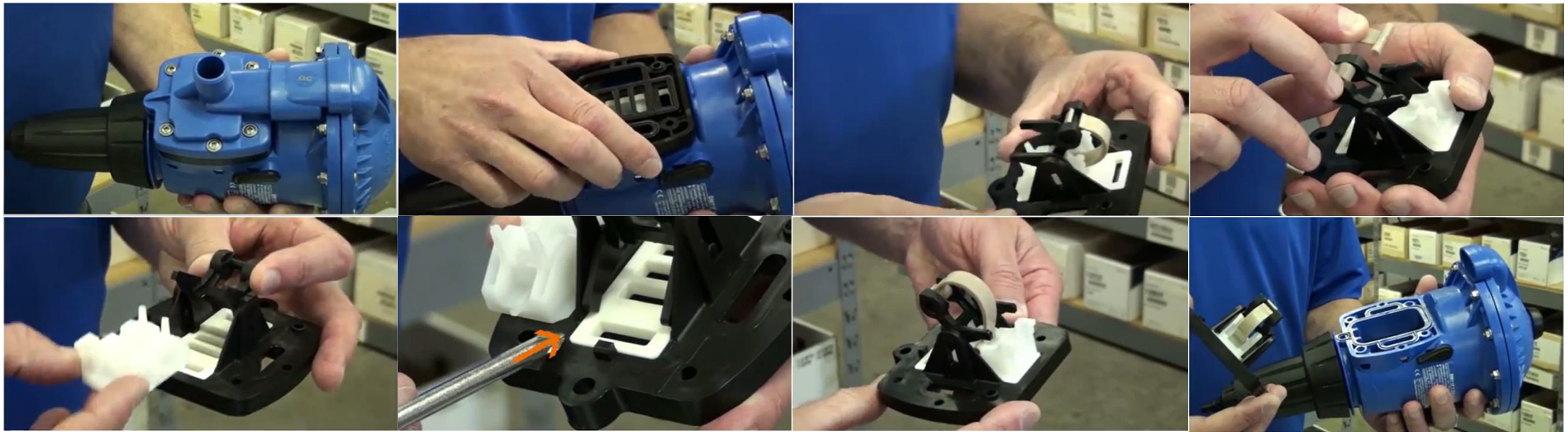
The Slider Assembly

a. Remove the six screws from the outlet plate assembly.
b. Remove the black plate and set the medicator aside.
c. Remove and replace the slider assembly that includes the white plastic slider, rocker, and the blade spring. Press the blade spring and lift up and off of the rocker. Then, remove the white plastic slider; to remove the rocker, spread the supports and pull it up. and forth. It should click each time and not bind.



TROUBLESHOOTING: NOT CLICKING… CONTINUED

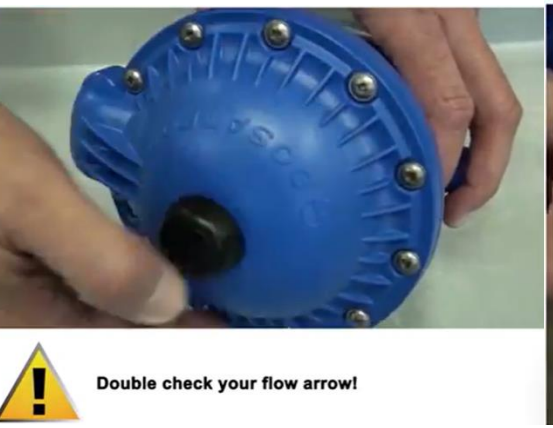
d. To reassemble, insert the new rocker. Align the arrow on the slider with the two arrows on the axel plate and reinstall the slider. Next, hook the blade spring on the rocker and press the axel into the top of the slider. If you hold the axel plate with the arrow facing you, the blade spring will curve away. Test the assembly by pushing the slider back and forth. It should click each time and not bind.
e. Position the slider so that the small tooth touches the little stop.
f. Reinstall the assembly into the housing and reinstall the outlet plate. Take care not to pinch the oval shaped O-rings.

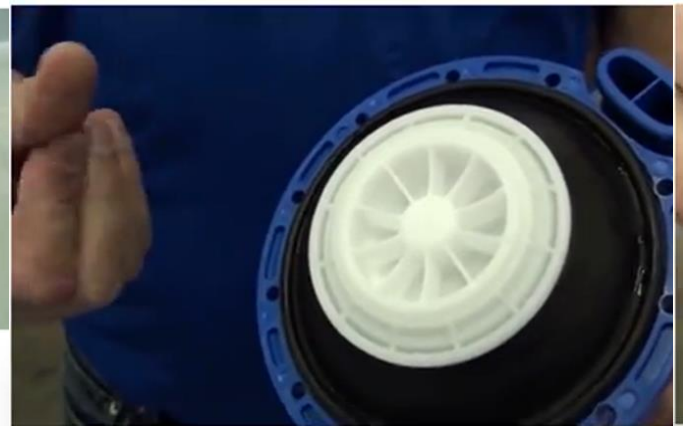


TROUBLESHOOTING: NOT CLICKING

The Black Rubber Diaphragm

a. If you install the medicator and it still doesn't click, remove the 11 nuts and bolts around the lid. Inspect the black rubber diaphragm, if it has damage or it bleeds off onto your fingers, replace it.
b. To remove, unscrew the diaphragm assembly and discard.
c. Install the new part and hand tighten.
d. Reassemble the lid and the 11 nuts.
e. Unit should be working now.





TROUBLESHOOTING: SQUEAKING UNIT

This is NOT a sign of a technical issue with the proportioner unit. However, to resolve the noise, you can:

a. Open the unit
b. Clean the inside of the body and flanges
c. Use a non-ionic surfactant, compatible with chemical stock tank / tank-mix applications to eliminate the noise. You can also spray the flanges with a small amount of plain cooking spray, or food-grade spray silicone to lubricate
d. Close the unit and put it back to function

TROBLESHOOTING: SUCTION HOSE AIR BUBBLES

- An air bubble in the suction hose will NOT change the dosing, if the hose is fully primed from the bubble to the proportioner unit.

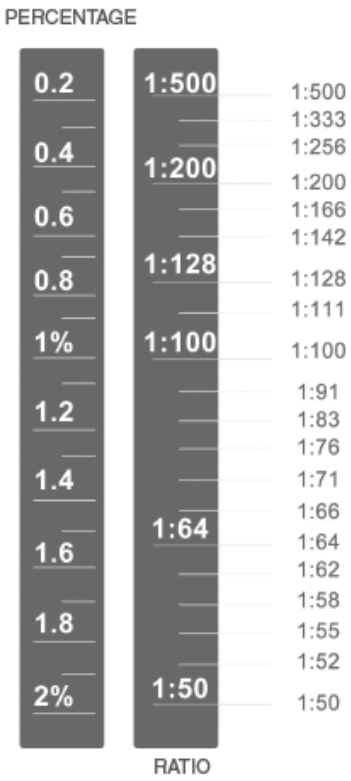
- If you'd like to remove the bubble, lift the hose so the bubble gradually moves towards the proportioner until its drawn inside. The hose should now remain fully primed without bubbles

DOSATRON TECHNICAL SUPPORT

- Visit **www.dosatronusa.com** for more information on Maintenance, Troubleshooting, and Service videos.
- Visit **DosatronIntl YouTube** channel to view our whole video library
- If in-the-field service is not the best option for you, simply send the Dosatron unit to **Clearwater Service Center** for a comprehensive evaluation and any necessary maintenance. Call **1-800-523-8499** for more details

VII. PROPORTIONER SETTING, PERCENT/DILUTION/INJECTION RATES

DILUTION CONVERSION CHART



1 Ounce = 29.57 Milliliters
1 Gallon = 3.79 Liters

VOLUME OF PRODUCT INJECTED PER VOLUME OF INCOMING WATER			
PERCENTAGE	RATIO (chemical : water)	OUNCES PER US GALLONS	MILLILITERS PER LITER
10	1:10	12.800	100
5	1:20	6.400	50
4	1:25	5.120	40
3.333	1:30	4.267	33.33
3.125	1:32	4.000	31.25
3.03	1:33	3.879	30.3
2.5	1:40	3.200	25
2	1:50	2.560	20
1.667	1:60	2.133	16.6
1.429	1:70	1.829	14.29
1.25	1:80	1.600	12.5
1.111	1:90	1.422	11.11
1	1:100	1.280	10
0.781	1:128	1.000	7.8
0.667	1:150	0.853	6.67
0.571	1:175	0.731	5.71
0.526	1:190	0.674	5.26
0.5	1:200	0.640	5

VOLUME OF PRODUCT INJECTED PER VOLUME OF INCOMING WATER			
PERCENTAGE	RATIO (chemical : water)	OUNCES PER US GALLONS	MILLILITERS PER LITER
0.313	1:320	0.400	3.13
0.286	1:350	0.366	2.86
0.25	1:400	0.320	2.5
0.2	1:500	0.256	2
0.195	1:512	0.250	1.95
0.167	1:600	0.213	1.67
0.156	1:640	0.200	1.56
0.143	1:700	0.183	1.43
0.133	1:750	0.171	1.33
0.125	1:800	0.160	1.25
0.111	1:900	0.142	1.11
0.1	1:1000	0.128	1
0.80	1:1250	0.102	0.8
0.067	1:1500	0.085	0.67
0.050	1:2000	0.064	0.5
0.033	1:3000	0.043	0.33

Source: Complete guide of best practices for Dosatron injectors. www.dosatron.com

DILUTION CONVERSION CHART

DESIRED DOSAGE CONCENTRATION			DOSER SETTING	
mL / gallon (milliliters)	tsp / gallon (teaspoons)	oz / gallon (ounces)	Set % to:	Set Ratio to:
1	0.2	0.033	0.026	3875
1.25	0.25	0.042	0.03	3000
2	0.4	0.067	0.05	2000
3	0.6	0.100	0.08	1250
3.5	0.7	0.117	0.10	1000
4	0.8	0.133	0.11	950
5	1	0.167	0.13	750
6	1.2	0.20	0.16	625
7	1.4	0.23	0.18	540
7.5	1.5	0.25	0.20	500
8	1.6	0.27	0.21	475
9	1.8	0.30	0.24	425
10	2	0.33	0.26	375
11	2.2	0.37	0.29	350
12.5	2.5	0.42	0.33	300
15	3	0.50	0.40	250
17.5	3.5	0.58	0.46	220
20	4	0.67	0.53	190
25	5	0.83	0.66	150
30	6	1.0	0.79	128
34	6.8	1.1	0.9	112
37.5	7.5	1.3	1.0	100
50	10	1.7	1.3	75
75	15	2.5	2.0	50
190	38	6.3	5.0	20
375	75	12.5	10.0	10
750	150	25.0	20.0	5

Need help with conversions?

Call 1-800-523-8499

Chat with the specialists:
www.dilutionsolutions.com

Source: Complete guide of best practices for Dosatron injectors. www.dosatron.com

VIII. ADDITIONAL RESOURCES

DOSATRON KNOWLEDGE CENTER - VIDEOS

- Dosatron DM11 Spotlight: https://www.youtube.com/watch?v=-EbLvQXgsxA&list=PLtzMeVFpvQQFRfZFuv-cxuEK8XPkOileQ&index=4
- Dosatron Diaphragm DM11F Video: https://www.youtube.com/watch?v=iiEkbGSkyIM
- Diaphragm Metering Pump: Precision and Reliability (DM11): https://www.youtube.com/watch?v=nwIANPUS_ME&t=28s
- Bomba Dosificadora de Diafragma: Precisión y Confiabilidad: https://www.youtube.com/watch?v=mls6sfMUmDQ
- Dosatron DM11F Service Video: https://www.youtube.com/watch?v=hKEc4HNLvb4
- Dosatron DM11F Medicator Troubleshooting Video: https://www.youtube.com/watch?v=Xw0aY3WfLXk
- Dosatron Maintenance Kits Explained: Rebuild vs. Seal vs. Mini Kit: https://www.youtube.com/watch?v=qVFW1teQ9Rw

OTHER MEDICATORS WEBSITES

- Stenner Pumps: https://stenner.com/products/pumps/s128/
- Chemilizer: https://www.hydrosystemsco.com/products/chemilizer.html
- Hogslat Website Listing Medicators in the Market: Medicator Pumps | Hog Slat

Thank you.

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