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THE INSIDE CHIRP

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WATER QUALITY

AVIAGEN MANAGEMENT ESSENTIALS

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INTRODUCTION

Water is an essential biological ingredient for life. Not only is it a vital nutrient, but it is also involved in many essential physiological functions such as:

- Digestion and absorption, where it supports enzymatic function and nutrient transportation.
- Thermoregulation
- Lubrication of joints and organs and the passage of feed through the gastrointestinal tract.
- Elimination of waste

It is also an essential component of blood and body tissues

Due to the essential role that water plays in the health and performance of biological systems, it is vital to ensure that an adequate, clean supply of water is provided if optimal bird performance is to be achieved.

WATER QUALITY

Water should be clear with no organic or suspended matter. It should be monitored to ensure purity and freedom from pathogens. Specifically, water should be free from Pseudomonas species and Escherichia coli. There should be no coliforms in any one sample.

Table 1 provides water quality criteria for poultry. Water from a municipal supply usually has fewer water quality issues. However, water from wells or boreholes may have excessive nitrate levels and high bacterial counts due to runoff from fertilized fields.

Where bacterial counts in water are high, the cause should be established and rectified immediately. Chlorination to give between 3–5 ppm of free chlorine at the drinker level is usually effective in controlling bacteria and viruses, but this is dependent on the type of chlorine component used. When treating water with chlorine, water pH should be kept between 6.5-8.5. If the water pH is above this, the effectiveness of the chlorine will be decreased.

Measuring the oxidative reduction potential (ORP) of water is a good way to determine if the water sanitation program is working **Figure 1**. The oxidation value of a water sanitizer reflects its activity rather than its concentration level (ppm).

Chemicals like chlorine, bromide, hydrogen peroxide, peroxyacetic acid, and ozone are all oxidizers; therefore, ORP readings are important in determining their effectiveness. An ORP meter indicates the cleanliness of the water and its ability to break down contaminants. The more contaminants in the water, the lower the amount of O_2 and the lower the ORP reading. An ideal ORP reading should be between 650 and 800 mV.

An ORP reading of over 650 mV indicates that a water sanitation program using chlorine will effectively control most potential challenges that are waterborne or spread to the birds via the water supply. If the ORP is below 650 mV, pH, chlorine concentration, water purity, and waterline cleanliness must be checked. ORP meters are relatively inexpensive, and if used, the manufacturer's calibration, testing, and cleaning instructions should be followed.

Figure 1:
An example of an ORP meter.

Table 1:
Water quality criteria for poultry

Criteria	Concentration (ppm)	Comments
Total Dissolved Solids (TDS)	<1,000	Good.
	1,000–3,000	Satisfactory: Wet droppings may result at the upper limit.
	3,000–5,000	Poor: Wet droppings, reduced water intake, poor growth, and increased mortality.
	>5,000	Unsatisfactory.
Hardness	<100 Soft	Good: No problems.
	>100 Hard	Satisfactory: No problem for poultry, but can interfere with effectiveness of soap and many disinfectants and medications administered via water.
pH	<6	Poor: Performance problem, corrosion of water system.
	6.0–6.4	Poor: Potential problems.
	6.5–8.5	Satisfactory: Recommended for poultry.
	>8.6	Unsatisfactory.
Sulfates	<200	Satisfactory: May have a laxative effect if sodium (Na) or magnesium (Mg) is >50 ppm.
	200–250	Maximum desirable level.
	250–500	May have a laxative effect.
	500–1,000	Poor: Laxative effect (birds may adjust), can interfere with copper absorption; additive laxative effect when combined with chlorides.
	>1,000	Unsatisfactory: Increased water intake and wet droppings, health hazard for the young birds.
Chloride	<250	Satisfactory: Maximum desirable level, levels as low as 14 ppm may cause problems if sodium is >50 ppm.
	250–500	Acceptable with caution.
	>500	Unsatisfactory: Laxative effect, wet droppings, reduced feed intake, increases water intake.
Potassium	<300	Good: No problems.
	>300	Satisfactory: Depends on the alkalinity and pH.
Magnesium	50–125	Satisfactory: If sulfate level is >50 ppm magnesium sulfate (laxative) will form.
	>125	Laxative effect with intestinal irritation.
	300	Maximum desirable level.
Nitrate Nitrogen	10	Maximum (sometimes levels of 3 mg/L will affect performance).
Nitrates	Trace	Satisfactory.
	>Trace	Unsatisfactory: Health hazard (indicates organic material fecal contamination).
Iron	<0.3	Satisfactory.
	>0.3	Unsatisfactory: Growth of iron bacteria (clogs water system and bad odor).
Fluoride	2	Maximum desirable level.
	>40	Unsatisfactory: Causes soft bones.
Bacterial Coliforms	0 colony forming unit (CFU)/mL	Ideal: Levels above indicate fecal contamination.
Calcium	60	Average level.
Sodium	50–300	Satisfactory: Generally no problem, may cause loose droppings if sulfates are >50 ppm or if chloride is >14 ppm.

***If there are issues with intestinal health, a more acidic water pH of 5–6 will be beneficial.**

Ultraviolet light (applied at the point of drinking water entry to the house) can also be used to disinfect water. Manufacturers' guidelines should be followed when establishing this procedure.

Hard water or water with high iron levels (>3 mg/L) can cause blockages in drinker valves and pipes and support growth. Sediment will also block pipes; where this is a problem, water should be filtered using a 40–50 micron (µm) filter.

A total water quality test should be done at least once a year and more often if there are perceived water quality issues or performance problems. After house cleaning and before chick delivery, water should be sampled for bacterial contamination at the source, the storage tank, and the drinker points.

It is a good idea to routinely check the farm's water supply quality during a flock. This can be done by running water out of the end of each water line and checking for clarity. If water lines and sanitation are not adequate, a high level of particulate matter will be visible to the naked eye. If this occurs, take action to rectify the issue. However, the absence of visible particles does not guarantee the water is clean. Regular testing and maintenance are key to ensuring water quality.

KEY POINTS

- Good water quality is essential for bird health and welfare.
- Water quality should be routinely tested for bacterial and mineral contamination and corrective action taken as necessary based on the test result.

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