Common Poultry Water Quality Standards and Treatment Options

Water Quality Indicator	Levels Considered average	Maximum Acceptable Level	Maximum Acceptable Levels	Treatment Options/Comments
Total Bacteria (TPC)	0 CFU/ml	1000 CFU/ml	Dirty system, may taste bad and COULD have pathogens in the water system Water with >50 total coliforms or any faecal coliform has been in contact with human or animal faeces	Clean the system between flocks with approved sanitizing cleaners and establish a daily water sanitation system when birds are present Shock chlorinate as well
Total Coliforms	0 CFU/ml	50 CFU/ml		
Fecal Coliforms	0 CFU/ml	0 CFU/ml		
pH	6.5 - 7.8	5-8	below 5 - metal corrosion above 8 - Water sanitizers work poorly, “bitter” taste	Raise pH with soda ash (Na_2CO_3), lime Ca $(OH)_2$ or sodium hydroxide (NaOH) Lower pH-phosphoric acid, sulphuric acid and hydrochloric acid for strong alkalinity, citric acid and vinegar for weak alkalinity
Iron (Fe)	0.2 mg/l	0.3 mg/l	Birds tolerant of metallic taste Iron deposits in drinkers may cause leaking Can promote growth of bacteria such as *E. coli* and Pseudomonas	Treatment includes addition of one of the following:chlorine, chlorine dioxide or ozone then filtration removal with proper sized mechanical filtration
Manganese	0.01 mg/l	0.05 mg/l	Can result in black grainy residue on filters and in drinkers	Similar to iron but can be more difficult to remove due to slow reaction time Chlorination followed by filtration most effective in pH range of 8.5, needs extended contact time with chlorine prior to filtration unless using Iron X media Ion exchange resin if pH is 6.8 or above Greensand filters with pH above 8.0
Alkalinity	100 mg/l	300 mg/l	Associated with bicarbonate, sulphates and calcium carbonate • Can give water a bitter taste which makes it undesirable to the birds High levels can make it difficult to lower the pH Can be corrosive to cool cell pads	Acidification Anion Exchange de-alkalizer Can be reduced by removing free CO_2 (carbon dioxide) through aeration
Total Hardness	Soft 0 - 75mg/l as $CaCO_2$ Somewhat hard 76 to 150 Hard 151 to 300 Very Hard >300		Hardness causes scale which reduces pipe volume and drinkers are hard to trigger or leak (main factors are calcium and magnesium, but iron and manganese contribute small amount)	Do not use water softener if water already high in sodium unless using potassium chloride instead of sodium chloride (salt) Polyphosphates will sequester or tie-up hardness and keep in solution Acidification to below pH of 6.5
Calcium (Ca)	60 mg/l		No upper limit for calcium, but if values are above 110 mg/l may cause scaling	Treatment same for hardness
Magnesium (Mg)	14 mg/l	125 mg/l	May cause flushing due to laxative effect particularly if high sulphate present	Treatment same for hardness
Chloride (Cl)	50 mg/l	150 mg/l	Combined with high Na levels, can cause flushing and enteric issues Can promote Enterococcus bacterial growth	Reverse osmosis, blend with non-saline water, keep water clean and use daily sanitizers such as hydrogen peroxide or iodine to prevent microbial growth
Sodium (Na)	50 mg/l	150 mg/l	With high Cl levels can cause flushing Can promote Enterococcus bacterial growth	Reverse Osmosis Blend with non-saline water Keep water clean and use daily sanitizers such as hydrogen peroxide or iodine to prevent microbial growth
Sulphates	15 - 40 mg/l	200 mg/l	Sulphates can cause flushing in birds Rotten egg smell is hydrogen sulphide, by-product of sulphur-loving bacteria growth - this can cause air locks in water system as well as flushing in birds Since sulphides can gas off, test results may underestimate actual level present	Aerate water into a holding tank to gas off sulphur Anion exchange (chloride based) Treatment with oxidizing sanitizers then filtration If a rotten egg odour is present, shock chlorination of well is recommended plus a good daily water sanitation program while birds are present
Nitrates	1 - 5 mg/l	25 mg/l	Poor growth and feed conversions May indicate fecal contamination, test for coliform bacteria	Reverse osmosis Anion exchange
Lead	0 mg/l	0.05 mg/l	Can cause weak bones and fertility problems in broiler or turkey breeders	Lead is not naturally occurring. Look for pipes, fittings or solder that contain lead Water softeners and activated carbon can reduce lead
Copper	0.002 mg/l	0.6 mg/l	High levels can cause oral lesions or gizzard erosion	Source is most likely from the corrosion of pipes or fittings
Zinc		1.5 mg/l	Higher levels may reduce growth rates	Look for locations where water may have come in contact with galvanized containers Water softener and activated carbon will reduce adsorption

**Adapted from Watkins 2008*