

## Water for Pigs and Poultry

# Water issues and solutions

Last updated December 2024

This Factsheet follows on from Factsheet 1 of this series and deals with general risk issues associated with water, along with some general solutions.

### What is water quality about?

Water quality generally concerns pH, mineral content and bacterial count. However, important factors such as age of the animal as well as environmental conditions and relative levels of all components in the feed and water should be considered when making decisions about water sources and relationships to animal productivity and health. Environmental conditions associated with reduced water availability and associated higher levels of salinity in source water are increasingly important given the changing climate.

### A note about salinity

Salinity is a relevant consideration in southern Western Australia (WA) and can be defined as the sum of all mineral salts present in the water, including sodium, calcium, magnesium, chloride, sulphate and carbonate. Most of the information on this topic that is readily available focusses on sulphate and its associated issues. More generally in WA, salinity is associated with sodium chloride with high sulphate levels being less common. Salinity is often measured as an electrical conductivity (EC) reading in micro Siemens per centimetre ( $\mu\text{S}/\text{cm}$ ) or calculated using the Total Dissolved Solids (TDS) value (in mg/L or ppm). Generally in Australia, the EC value can be obtained by dividing the TDS value by 0.64 to give  $\mu\text{S}/\text{cm}$ . Important considerations about salinity and TDS are explored in Education Note 1 of this series.

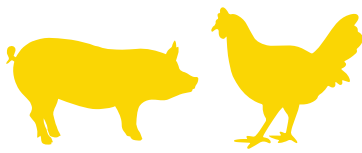
### General risk issues and simple solutions

General risks associated with water quality are often similar for pigs and poultry and the solutions may be similar, especially for intensive operations. The simple information provided in Table 1 should be used as a guide only. Risks specific to an enterprise should always be considered when any solution is sought. In addition, if there is more than one issue, then potential interactions should be factored into any solutions.

### Know combined nutrients in feed and water and seek advice if necessary

In many cases, the simplest solution to an issue associated with water and feed components is to test both and adjust where possible. When this results in an unsatisfactory outcome, more sophisticated solutions should be included in any decision making. Obtaining reliable information from experts is then important.

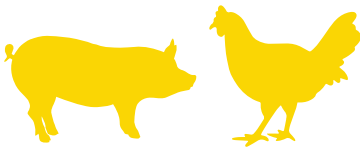




**Table 1. General risk issues associated with water quality for pigs and poultry and general solutions**

Parameter	General risk issues	General solutions
pH	A level less than 5 can produce metal corrosion. Levels higher than 7 increase the risk of <i>E. coli</i> in the water. Readings above 8 can affect the performance of disinfectants and the taste of water, as well as increase scale deposit.	Add basic agents to increase pH. Add organic or acidic minerals to decrease pH. Ensure any additives do not cause other problems.
Alkalinity	Usually a value associated with bicarbonate, sulphates, and calcium carbonate. High levels can: result in a bitter taste to water that can reduce water intake; be corrosive to evaporative panels; make it difficult to lower the water pH.	Add organic or acidic minerals to decrease water alkalinity (keep in mind pH levels). Ensure any additives do not cause other problems.
Total Dissolved Solids (TDS)	TDS is a measure of the total minerals dissolved in water and may be used as a proxy for salinity. TDS levels above the recommended level can cause salt poisoning. If it is due to sodium chloride, animals may: reduce feed and water intake; initially increase urination, then produce small amounts of concentrated urine (disrupted kidney function); have diarrhoea; display abnormal behaviour associated with physical irregularities; have reduced growth; or die. Excess potassium, magnesium, calcium, nitrate, sulphate and carbonate can cause other symptoms.	Minerals that contribute to high TDS, e.g., sulphate and sodium chloride, vary depending on location. Therefore advice must be contingent upon an ion analysis to determine the concentrations of specific ions. Depending on the results of relevant analyses, options such as filtration methods can be used to decrease TDS.
Salinity measured as Conductivity	See the description for TDS above.	See description for TDS above.
Salt (as NaCl)	See the description for TDS above.	See description for TDS above.
Total Hardness	Water hardness can produce scale that deposits on the inner surface of pipes. Calcium and magnesium usually cause most of the associated issues. Iron and manganese can also contribute but to a lesser extent. Very high levels can also impact on medications and vaccines.	Flush lines often with acidifiers to reduce build-up of scale and biofilm (made up of fungi, algae, bacteria, and other organic contaminants that build up on surfaces).
Turbidity	Turbidity is an indicator of how much solid matter (such as clay, silt, organic matter and micro-organisms) is suspended in the water.	Remove suspended matter including blue-green algae, bacteria or chemical pollutants from the water.
Nitrate	Excess nitrate can induce illness. In poultry excess levels can decrease fertility, lower feed intake so reducing weight gain, and reduce the absorption of oxygen resulting in listless birds that may have violet combs and wattles.	Check the content of nitrates in the diet. Decrease concentrations in the water by mixing water sources with different levels of nitrate.
Nitrite	Nitrite in low concentrations is toxic. It affects the oxygen-carrying capacity of the blood resulting in breathing difficulties for animals.	Can use reverse osmosis or ion exchange to reduce nitrite levels.
Chloride	Along with sodium and potassium, chloride is required for a number of body functions such as regulation of osmotic pressure and pH balance. Excess chloride levels indicate a risk of salt toxicity. See the description for TDS above. Note that low levels of chloride can cause greater issues if sodium is also present.	Chloride levels vary depending on environment. Therefore advice should be contingent upon an ion analysis to determine the concentration. Chloride levels in the diet can be varied as well as those in the water.

Parameter	General risk issues	General solutions
Iron	Excess iron can promote bacterial growth and reduce the effectiveness of some medications.	Consider the use of acidifiers to reduce bacteria. Be mindful of water pH if using this solution. If chloride levels are low, addition of a chloride compound or ozone followed by a mechanical filtration process may be an option.
Manganese	Black particles may build up in filters and drinkers.	If chloride levels are low, addition of a chloride compound or ozone, over a period of time, followed by a mechanical filtration process may be an option. Take into account pH when the filtration is done.
Sulphate	Issues due to excess sulphate are made worse by the presence of other elements such as magnesium and chloride, and result in decreased production. If hydrogen sulphide (rotten egg odour) is present, it may indicate increased corrosion in the pipe system.	Aerated storage water can stop air bubbles forming in lines. Depending on chloride levels, chlorine shots can be used with normal disinfection.
Fluoride	Excess fluoride levels can induce soft bones in older animals and may weaken teeth, particularly in young animals.	Reduce fluoride in the feed.
Sodium	Together with excess chloride or sulphate, surplus sodium can cause diarrhoea. It can also promote the growth of Enterococci and in poultry, excess sodium can alter eggshell quality.	Sodium levels vary depending on location. Advice should be contingent upon an ion analysis to determine the concentration. To counter excess sodium, dietary sodium can be varied. Water with high and low levels of sodium can be blended. To prevent bacterial growth, sanitisers can be used.
Magnesium	Together with excess chloride or sulphate, magnesium can cause diarrhoea.	See description for Total Hardness above.
Potassium	Effects depend on water alkalinity and pH.	Rarely an issue but can reduce potassium in the diet.
Calcium	Excess levels can cause scale buildup.	See description for Total Hardness above.
Zinc	Excess levels are toxic for pigs and poultry with various symptoms including lethargy and other conditions that impact production.	Filter water to remove excess zinc.
Copper	Excess levels can impact growth.	Reduce copper in the diet.
Selenium	Excess levels are toxic for animals.	Reduce selenium in the diet.
Phosphate	Excess phosphate is excreted in manure and may cause environmental issues.	Reduce phosphorus in the diet.
Total CFU	CFU (colony forming units) measure the concentration of live, viable coliforms and should be carefully monitored to ensure acceptable levels. Higher temperatures cause greater toxicity.	Depending on water analysis results, chemical (based on e.g., chloride compounds) or physical treatments (such as laser, ultraviolet light or electromagnetic treatments) can be effective.
<i>E. coli</i>	Young animals require less <i>E. coli</i> than older animals to cause a toxic effect resulting in diarrhoea.	Treat the water as for Total CFU.



## Further information

Factsheet 1 of this series provides information about water requirements.

Factsheet 3 of this series gives information about providing water and measuring quality.

Education Notes 1 to 3 focus on water supply and demand for pork and poultry production, water quality and water salinity.

These Factsheets and Education Notes can be found at the Pork Innovation WA website: <https://www.piwa.com.au>

**#This Factsheet has been written using the following references. Please refer to them for further information.**

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