Education Note #3

Water for Pigs and Poultry

Water salinity

Last updated December 2024

Implications of water salinity

Salinity of the water animals drink is an important property affecting water consumption. Western Australia (WA) has the largest underground salt reserves in Australia (Sexton, 2003). Hence, high levels of chloride (Cl) and sodium (Na) could be prominent in groundwater fed to animals.

Abbas *et al.* (2009) reiterated the fact that commercially farmed birds mostly receive a balanced diet and so high levels of Na and Cl in their water may negatively affect their performance. ANZG (2023) further describe the issues of egg shell defects when chickens are fed water with excess mineral salts.

Edwards and Crabb (2021) noted that in pigs, excess Cl and Na can cause increased water intake, can affect the gut microbiome, and importantly impact the activity of some antibiotics delivered via the water. This being the case, Pluske *et al.* (2006) found that small increases in water use, due to, for example, a high salt level and (or) the price associated with water treatment, decreased overall piggery financial viability.

Acceptable water salinity

Edwards and Crabb (2021) found that Cl and Na were among the most common water parameters to exceed the acceptable standard (250 mg/L and 150 mg/L, respectively) in source water fed to pigs produced in Australia. Watson *et al.* (2020) recommended that in meat chickens the best practice level for Na was below 32 mg/L and for Cl, below 14 mg/L. They suggested that the maximum acceptable level for Na was 150 mg/L and for Cl, 150 mg/L.

The Total Dissolved Solids (TDS) content is often used as a proxy to represent salinity with e.g., DPIRD (2021a) suggesting that the approximate tolerance level for pigs is water with TDS less than 3,000 mg/L and less than 2,000 mg/L for poultry. However, Pluske and Pluske (2023a) showed that there is a disparity between recommended TDS, Cl and Na levels in water. Hence, it is important that producers understand what makes up the TDS value in their water. If it is mostly Cl and Na, then a TDS level of 500 mg/L is almost certainly ideal and possibly a TDS as high as 800 mg/L could be acceptable (Pluske and Pluske, 2023a). ANZG (2023) has suggested that if TDS (salinity) is of concern, less than 500 mg/L should be the guideline value for livestock.

Monitoring salinity in water

ANZG (2023) emphasised that water for livestock should be regularly monitored and tested, and specifically if livestock appear to have health or growth issues or during periods of warm weather when evaporation can increase the concentration of ions in water. Pluske and Pluske (2023a) noted that producers can readily purchase water testing meters but should be aware of the limitations associated with them. For example, they will not give the level of Na and Cl in water. Testing for Cl and Na in water samples can be done by NATA accredited testing and analysis laboratories in WA.

As explained by DPIRD (2021a), a representative sample from a water source is important due to various factors. For example, for that source: surface water may have a different salinity content to water found at deeper levels; with evaporation or a saline groundwater seep, salinity levels may increase over time.

Pluske and Pluske (2023b) tested three meters, the *Eutech pocket PCSTester 35 pH/Cond/TDS/Sal/Temp*, the *AD11 pH/Temp/ATC Pocket Tester (0.1 Res)* and the *AD32 EC/TDS/Temp Hi Range Tester 1 – 20MS/ 1-10PPT.* They found that in comparison with testing done by the Marine and Freshwater Research Laboratory (MAFRL) at Murdoch University, all provided reliable results. They also found that when comparing like for like, there was no difference in values between these meters. However, to ensure reliable results, it is important that the instructions for calibration, use and storage for each meter are carefully followed by the user.

It is important that producers have a good understanding of TDS in terms of the inorganic salts that comprise their TDS measurement. Watson *et al.* (2020) suggested that for optimal water salinity, TDS should be measured on a

weekly basis and analyses, for elements such as Na and Cl, should be done annually. As Pluske and Pluske (2023b) noted, determining the relationship between Cl and Na in the feed and water offered to animals could ultimately enhance financial viability.

Applicable water treatment options

The simplest option for dealing with saline water is to mix it with water with low Na and Cl concentrations so that water with an acceptable salt level is fed to pigs and poultry. Furthermore, to reduce total salt intake, nutritionists can consider salinity concentrations in the water when formulating animal diets.

Alternatively, Watson *et al*. (2020) suggested that if salinity concentrations are above maximum acceptable levels, a pre-treatment to lower salts can be applied to drinking water. They detail effectiveness of such treatments and suggest that filtration has the lowest effectiveness with reverse osmosis being most effective.

There is considerable interest in reverse osmosis to secure water supplies for agricultural production (DPIRD, 2021b) with a detailed description of desalination provided in DPIRD (2021c). It is recommended that in considering this option the net benefits of the chosen system and the associated regulations are understood.

Further information and references

Factsheet 1 of this series provides information about water requirements.

Factsheet 2 of this series provides information on issues associated with water quality and solutions.

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

Education Notes 1 and 2 focus on water supply and demand for pork and poultry production, and water salinity.

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

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