

## Livestock and water salinity

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### Salt

The total amount of minerals in solution in water – the total soluble salts (TSS) – determines its suitability for livestock unless the water is polluted. Other criteria are generally of secondary importance.

The types of salts in water are mainly common salt (sodium chloride), calcium and magnesium bicarbonates, chlorides and sulphates. In the agricultural areas of the State, about three-quarters of the total soluble salts in water is common salt – a ratio similar to seawater. This ratio may vary in some coastal and pastoral areas.

Usually the only practical method available for using water with total salts above the recommended limits is by mixing it with fresher water. The proportions can be calculated from the total soluble salt contents of the two waters.

### Changes in salinity

The salinity of a water source may change over the years and fluctuate with the seasons. Often, the salinity of dams, soaks and tanks increases during the summer because of evaporation.

Stream salinity fluctuates seasonally because of rainfall. Immediately after the first rains, there is a slug of high salinity as salts left on the dry creekbed over summer are flushed downstream. The salinity then drops as the flow increases due to the influx of fresh run-off water. When the flow eases as summer approaches, salinity rises again.

Long-term increases in water salinity are usually associated with secondary salinity related to land clearing. Salinity often increases in dams, soak and creeks after clearing because rising watertables lead to more saline seepage. Because of these changes following clearing, streams flowing from bushland areas are often fresher than nearby streams which have passed through cleared land.

Salinity in larger streams and rivers fluctuate seasonally, and in response to clearing, in a similar way to the small



streams. In many major rivers e.g. the Blackwood River, there is a decrease in salinity as the distance from the headwaters increases, because of the inflow of fresher streams in the higher rainfall coastal areas.

### Safety of water for stock

The quality of water which stock will drink varies greatly with circumstances and conditions. Usually stock become accustomed to the variations over the year, and suffer little effect. However, stock suddenly introduced to salty water may either refuse to drink it or suffer ill-effects.

Stock, thirsty from travelling or under extreme conditions may drink saline water for a short period. However, if used continuously, the saline water would cause ill-effects.

Limits of soluble salts in water for stock are listed in Table 1. These figures are a guide to maximum levels but should not be rigidly followed. At these maximum levels there should be no harmful effect on health, although production may fall and the animals should be watched carefully.

Water with less than 3,000 mg/L total salts can be used continuously by all livestock.

Where green feed is available, animals can tolerate more saline water than when 'bush' or 'scrub' is the only feed.

### Important Disclaimer

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**Table 1. Safe upper limits of total salts in water for livestock**

Livestock	mg/L	mS/m
Poultry	3,000	545
Pigs	3,000	545
Dairy cattle (lactating)	3,500	600
Beef cattle	5,000	900
Lambs, weaners, breeder ewes, dry dairy cattle	5,000	900
Horses	6,000	1,100
Adult sheep (dry)	10,000	1,820

Older dry stock can tolerate water of higher salinity than young or lactating stock.

In isolated circumstances, magnesium has been found at levels which affect a recommendation on total salts alone. A test for magnesium may be warranted when stock are scouring on drinking water with more than 3000 mg/L total salts.

Cloudiness of water due to clay suspension is not normally harmful to stock. However, bacterial or algal toxins found in stock water may cause harm. Advice on these aspects is available in Farmnotes 42/2004 and 44/2004.

## Signs of salt poisoning

### Sheep and cattle

The main signs of salt poisoning in sheep and cattle are excessive thirst, abdominal pain, loss of appetite, diarrhoea and increased urination. Later there is general weakness, muscular tremors, rapid loss of condition, and eventual paralysis. The animal may go into a coma, and die within 6 to 24 hours.

### Pigs

Pigs show dullness, loss of appetite, excessive salivation and apparent blindness, muscle twitching, walking in circles and eventually marked epileptic-form convulsions which may be followed by coma and death. In chronic cases, progressive emaciation, lethargy and profuse diarrhoea is seen, with deaths occurring after 10 to 14 days. Salt poisoning may cause abortion in sows.

### Poultry

Affected fowls show great thirst, weakness, a thick discharge from the nostrils and respiratory distress. There is progressive inability to walk and birds may fall from their perches. Death is apparently caused by asphyxia due to loss of power over the respiratory muscles.

## Treatment

Remove affected animals from the salty water to a fresh water supply. Initially fresh water should be restricted to small amounts, frequently. Unlimited access to fresh water may result in sudden increase in the number of affected animals.

Severely affected livestock may need to be drenched by mouth with fresh water. If further treatment is still required consult your veterinarian.

If death of stock does occur, and you suspect salt poisoning, contact your local consulting veterinarian to investigate and make an accurate diagnosis.

## Samples for analysis

Samples should be at least 500 mL in a clear glass or plastic bottle, with the bottle and cap previously rinsed three times with the water to be sampled. Use a clean screw cap, cork or stopper to seal the bottle, and mark with the sender's name, address and date of sampling.

Include a letter stating the proposed use of the water and any problems that have been found, so that the appropriate tests can be made. The water source such as dam or bore, and the depth from which the sample was taken, should be provided.

Any district office of the Department of Agriculture and Food will analyse water for its salt content or advise you of a local company which can assist you. However, the Chemistry Centre is the main State Government authority responsible for analysis of water. Advice on other problems and tests are available. Both the Department and the Chemistry Centre charge for testing services.

Samples for bacterial contamination are tested by the Pathwest and must be collected under sterile conditions by a health surveyor.

## Results of analysis

Results of water analyses are expressed in milligrams of total salt per litre (mg/L) or millisiemens per meter (mS/m). For water, milligrams per litre are the same as parts per million (ppm) or TSS for most practical purposes.

## Reaction – acidity or alkalinity

Neutral or slightly alkaline water is satisfactory for all uses. Water which is naturally slightly acid is not harmful to humans, stock or plants but may corrode pumps, metallic pipes and tanks. Acidity can be corrected by aeration or by adding alkaline substances such as lime.

## Further information

Further information is available from the Department of Agriculture and Food or from the Chemistry Centre, 125 Hay Street, East Perth 6004 on telephone 9222 3177

Related Farmnotes include:

42/2004 'Clearing cloudy or coloured water'

44/2004 'Emergency chlorination of farm water'

## Acknowledgement

Part of this Farmnote is reprinted from the Chemistry Centre's Bulletin 1/74 'Water for domestic, agricultural and general use in Western Australia'.