7-1954

Waters for agricultural purposes in Western Australia

Follow this and additional works at: https://researchlibrary.agric.wa.gov.au/journal_agriculture3

Recommended Citation

This article is brought to you for free and open access by Research Library. It has been accepted for inclusion in Journal of the Department of Agriculture, Western Australia, Series 3 by an authorized administrator of Research Library. For more information, please contact jennifer.heathcote@agric.wa.gov.au, sandra.papenfus@agric.wa.gov.au, paul.orange@dpird.wa.gov.au.
WATERS FOR AGRICULTURAL PURPOSES IN WESTERN AUSTRALIA

By Officers of the Department of Agriculture and the Government Chemical Laboratories.

The nature of water which stock will drink varies greatly with circumstances and conditions. In this State the variation between the summer and winter salinity of the same water supply may be very great, and if stock have been accustomed to watering from one source, the gradual increase of salinity which occurs with increasing summer concentration may pass unnoticed by the animals, who become accustomed to it and suffer little ill effects. If, however, stock which have been accustomed to drinking fresh water, are suddenly put on to a very salt supply, it may be quite distasteful to them, and they may either refuse to drink it or suffer ill effects from its use. Stock, if thirsty through travelling, or under extreme conditions may take and thrive for a short period on very saline water from which they would suffer if used continuously.

Such factors as these make the question more complicated than it at first appears, and although certain standards of composition are recorded, their application cannot be entirely rigid. Water containing less than 300 grains total salts per gallon can be used continuously by all farm livestock. Sheep can tolerate water which is much more saline than that suitable for cattle, and cattle are more resistant than horses and pigs.

The standards at present in use in this State as the safe upper limits of total salts in water for stock are:

<table>
<thead>
<tr>
<th>Species</th>
<th>Grains per gallon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poultry</td>
<td>200</td>
</tr>
<tr>
<td>Pigs</td>
<td>300</td>
</tr>
<tr>
<td>Horses</td>
<td>450</td>
</tr>
<tr>
<td>Cattle (Dairy)</td>
<td>500</td>
</tr>
<tr>
<td>Cattle (Beef)</td>
<td>700</td>
</tr>
<tr>
<td>Adult Dry Sheep</td>
<td>900</td>
</tr>
</tbody>
</table>

(437.5 grains = 1 oz.)

These total salts include common salt (sodium chloride), gypsum (calcium sulphate), Epsom salts (magnesium sulphate), Glauber's salts (sodium sulphate), bicarbonate of soda lime and magnesia.

In the agricultural areas of Western Australia about three-quarters of the total salts is common salt. The proportion of common salt is less in the pastoral areas and the northern part of the State.

When the total salts exceed these amounts, only practical tests will show whether the water can be used without ill effects, because varying conditions vary the allowable maximum amount of soluble salts.

Where green feed is available, the animals can tolerate more saline water than when "bush or scrub" is the only feed. Sheep have been known to live on water containing up to 1,300 grains per gallon of total salts for short periods, but success cannot be forecast with water so saline. Further, older and dry sheep can tolerate waters more saline than can young, growing sheep (weaners) or breeding ewes, and similarly for other stock. Lambs, weaners and ewes in milk should be kept under observation if drinking water containing more than 700 grains of total salts per gallon. Horses not at work can be kept alive on a more saline water than can horses at work.

As indicated in the table, dry or beef stock can tolerate a more salty water than can milking cows. However, waters with much less salts than the maximum of 500 grains per gallon given in the table will reduce the milk production of high yielding cows.

Although water may be too saline for use alone, it may be mixed with good water to lessen the drain on the good supply, e.g., when water carting is neces-
sary. The proportions for mixing can be calculated from the soluble salts content of the two waters.

Mixing with a fresh water is the only practical and economic method at present available for utilising saline waters.

WATER FOR IRRIGATION
The use of water for irrigation and domestic gardens is influenced not only by the amount of saline material dissolved in the water, but also by the type of soil and drainage, the climate and the rainfall. Much of the unsuitability of saline waters is due to the accumulation in the soil of the salts from the water applied.

The following remarks should therefore be taken only as a general guide, and it is emphasised that where the waters approach the maximum salinity for particular plants or where there exists special conditions of drainage, soil types, rainfall, etc., only practical tests will indicate the suitability of the water for the use in question. A more saline water can be used successfully on a well-drained light soil, than on a poorly drained heavy soil. Similarly a more saline water can be used in districts of high, though seasonal, rainfall, as the rain washes down the salts accumulated in the soil.

In general, where the drainage is good, water containing up to 70 grains total salts per gallon is suitable for growing all types of plants, including the salt susceptible plants.

Water containing up to 150 grains total salts per gallon, is suitable for growing most plants other than those susceptible to salt. Water containing up to 220 grains total salts per gallon, has been used for growing tomatoes, lucerne and cabbage and other salt resistant plants.

Above these limits, care should be taken to observe closely the growth and condition of plants or herbage, and if considered necessary, to obtain advice from the officers of the Department of Agriculture.

Generally, however, 220 grains of total salts per gallon is regarded as approaching the maximum for safe watering of any plants. With such salt content, the drainage should be excellent and each watering should be of sufficient quantity to leach accumulated salts to a level below the root zone.

In the case of nearly all underground waters, it is advisable to apply by furrows or by flooding rather than by sprinkling.

Where irrigation is not continuous, i.e., if the water is applied very infrequently, or only for short periods during the year then a water rather more saline than the above standards can be used.

Salt Tolerant Plants.
Artichoke, asparagus, beetroot, buffalo grass, cabbage, cauliflower, celery, cotton, couch grass, cucumber, date palm, fig, Kikuyu grass, lucerne, mangels, melons, olive, Paspalum vaginatum, pumpkin, rhubarb, silver beet, spinach, tomatoes, Wimmera ryegrass.

Salt Susceptible Plants.
Apricots, carrots, citrus, French beans, grape vines, maize, parsnips, peach, peas, potatoes, radishes, and seedlings.

There is no sharp, clear-cut dividing line between suitable and unsuitable water for either plants or animals. Just as plants and animals may under favourable conditions continue to live with waters more saline than the figures quoted, so growth and production will in general decrease as the salinity of the water approaches the various upper limits quoted.

GENERAL
1. For general domestic use and for human consumption on individual farms the safe upper limit of total soluble salts is considered to be 150 grains per gallon. The water should be clear, colourless and odourless and free from pollution or contamination by organic matter.

Generally, as the total soluble salts increase, so does the hardness of the water, i.e., the more difficult it is to obtain a lather with soap, and the more curd there is formed with soap.

Water containing up to 300 grains per gallon may be used for showers and baths especially if a salt water soap is used, and water containing up to 700 grains per gallon may be used in a septic tank system.

2. Natural waters may be acid (sour) (like diluted lemon juice or vinegar) or alkaline (like a weak solution of washing soda) or neither, that is, neutral.
3. Acid waters have a rapid corrosive effect on iron, such as pipes and tanks, and acidity should be corrected by the addition of good quality builder’s lime, the quantity depending on the degree of acidity. The required amount of lime should be mixed to a thin milk with water and this milk mixed thoroughly with the bulk of the water. It is advisable to allow time for any solids in the water to settle out before drawing off clear water. After liming it is desirable to aerate the water (by splashing) before use to remove any excess lime. The lime may be added direct to a well.

Limestone may be used instead of builder’s lime but takes longer to act. The limestone can be placed in the well, for example, as a cairn around the end of the intake pipe, or may be hung in a perforated bucket under the pipe entering the tank.

4. Some waters, particularly acid waters, may contain iron in solution and the addition of lime to correct the acidity will throw this iron out of solution as a sludge, which should be allowed to settle and the clear water used.

Waters containing iron compounds in solution may be clear and colourless when first drawn but become cloudy or deposit brownish yellow iron rust on standing, due to the action of the oxygen of the air on the iron compounds.

5. Water may contain hydrogen sulphide (sulphuretted hydrogen) a poisonous gas with a very objectionable odour similar to that of rotten eggs. This gas can be removed by aerating the water, the most convenient method usually being to allow the water to splash freely into the tank, e.g., by using a splash board under the pipe entering the tank.

Water which is coloured yellow or brown by organic matter in solution is satisfactory for stock and irrigation.

6. The clearing of muddy water by settling can be assisted by the use of kopi, powdery gypsum, at rates up to 4 lb. per 1,000 gallons of water, or by the use of good quality builders’ lime at rates up to 4 oz. per 1,000 gallons. If kopi is not available, plaster of Paris, well stirred with 10 times its weight of water may be used. If the water is a good one then common salt may be used to assist clearing, remembering that adding 1 lb. of common salt per 100 gallons of water adds 70 grains per gallon to the total salts present.

7. The salinity of ground water, particularly surface or shallow supplies, may change with time. It is not possible to forecast whether such change will occur, or whether the salinity will increase or decrease except that frequently there is an increase in salinity as the summer advances and a decrease during winter.

SAMPLES FOR ANALYSIS

Samples of water for stock, irrigation and domestic purposes, are analysed by the Government Chemical Laboratories, Adelaide Terrace, Perth, on compliance with the following:

A. Each sample should—

(a) Be approximately one pint of water in a clean container which has been previously rinsed with the water to be tested.

(b) Be clearly marked with the sender’s name, address and date of sampling.

(c) Be securely packed and addressed to the Government Chemical Laboratories.

At the same time, a letter should be forwarded stating—

(a) That the applicant is a bona fide farmer, market gardener, grazier, etc., and that the analysis is required in connection with his business as such;

(b) The source of the sample, e.g., bore, well, spring, etc., and its depth, and the location number of the property from which the sample was obtained.

(c) Enclosing the fee of 7s. per sample. This fee applies only to those who qualify under paragraph (B) (a) otherwise the fee is £1 Is. per sample.

Should the analysis be required very urgently, this should be stated in the letter and the cost of a telegram added to the fee, when a telegram will be sent immediately the analysis is completed.