

# Water Quality and its Effect on Sheep Production



An Overview  
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## Water Quantity

- Allowance roughly:
  - At least 4L per day pasture senescence to Autumn break
  - 2m evaporative loss (up to 50% of total volume)
  - less leakage?
  - plus spring?
  - 15% residual not fit for consumption
- By thumb a full 1500yd dam might water 100,000 sheep days in summer, ie: 200 days for a mob of 500.

**BUT**

## Water volumes

- 1 cubic metre =
  - 1kL
  - 1000L
- 1 yard (dam measurement)= 0.76 cubic metres

## How far will a dam go?

- Need to allow a large multiple for management –
  - Mob/class management
  - Grazing management
  - 20% additional for crossbred sheep
- Dam edges becoming boggy
- Water quality
  - Salinity and hardness
  - Algal bloom
  - Micro-organism contamination
- Sheep types with higher metabolic rate
- Minerals in forage(eg:saltbush) may increase intake.

## Salinity and Hardness

- Salinity mainly relates to chlorides and sulphates. All mineral cations in solution contribute to salinity (total dissolved salts,TDS)
- Hardness is mainly calcium and magnesium carbonates

## Measuring Salinity

- 1 electrical conductivity (EC)unit =

1000uS/cm  
640 ppm  
640 mg/L  
38 grains per gallon

## Sheep Tolerance Limits (of TDS)

EC	Suitable classes	Comment
1600	All sheep	
4700	All sheep	May get short term scour, no production loss
7800	Dry sheep Not for weaners Caution with wet ewes	
15600	Older dry sheep	Introduce gradually, no problems expected
23400	Dry sheep only	Short periods only, expect reduced performance

## Extra chloride limit

- 2400ppm for wet ewes and weaners
- So balance of water hardness needs to be carbonates

## Salt Toxicity

- Chloride role in the body mainly control of osmotic pressure across cell membranes and pH balance. Done in combination with K and Na.
- Increased osmotic pressure in the rumen affects microbial population, thus reducing sheep feed intake. Result is lowered production
- Dull and lethargic, abdominal pain
- Inappetant, wont drink
- Highly concentrated urine after brief period of increased urination
- Nasal discharge
- Neurological signs – star gazing, tremors, blindness, wobbly gait, head pressing
- Death

## pH

- Should be in the range 6.5 to 8.5
- Sheep may reject water outside this range
- Depressed appetite
- Loss of production

## Toxic compounds

- As
  - Pb
  - Se
  - Hg
  - F
  - Fe
- All can be present in water in toxic concentrations, though rarely

## Particulates

- Microparticles generally OK eg: suspended clay
- Macroparticles act as a physical barrier for watering sheep. Main reason to clean debris from dams after a storm

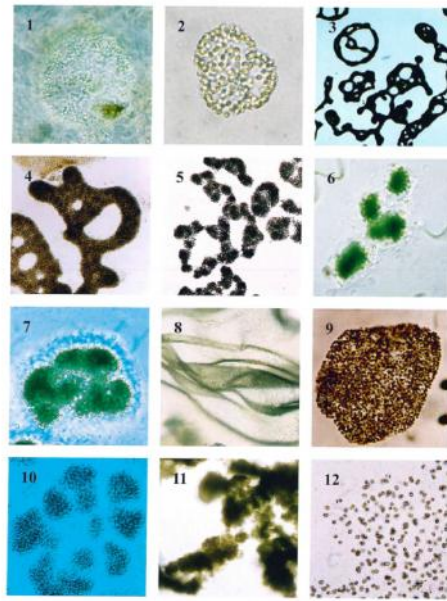


## Algae

- May contribute to a barrier for watering sheep, produce fouling compounds which reduce palatability, and occasionally produce toxic blooms
- Three main groups which produce either liver toxins or neurotoxins
- Toxic blooms only form when –
  - Still water
  - High nutrient load
  - Warm temperature
- ie: our post-January storm affected dams are at risk from now on

## Toxic Algae

- Symptoms – depressed, weak, stagger, convulsions, sudden death in 24hrs  
- jaundice, photosensitisation, chronic illthrift.
- Easy to diagnose from water samples by lab technicians
- Treatments:
  - Remove stock to safe water
  - Add simazine or copper chelate to water.
  - Don't use Copper sulphate due to risk of copper poisoning in sheep with liver damage.



Photos 1-12: (1) *Coccolophaerium confertum*; (2) *Coccolophaerium* aff. *laetingianum*;  
 (3-4) *Microcystis aeruginosa*; (5-7) *Microcystis hirtys*; (8) *Microcystis firmis*;  
 (9) *Microcystis flosoquae*; (10) *Microcystis ischyroblabae*; (11) *Microcystis pumiformis*;  
 (12) *Microcystis protocystis*.

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## Other Comments

- Cool water (lower than body temp, 37.5C) preferred.
- May avoid warm water if not adapted resulting in problems where water demand is high.
- Short term spike of water demand eg: post-shearing during a heat wave.



## Enteric pathogens in farm water supplies

- Contaminate water via faeces
- Infect sheep by ingestion of contaminated feed and water
- Present on most farms where sheep are run.

### Pathogen

### Prevalence on farm

- |   |                           |
|---|---------------------------|
| • <i>Salmonella enterica</i> * - enteritis          | 5%, highly variable       |
| • <i>Cryptosporidium parvum</i> * - enteritis       | 30-40%, highest in WA     |
| • <i>Giardia duodenalis</i> * – protozoal enteritis | 20%, up to 40% in WA      |
| • <i>Campylobacter jejuni</i> – enterocolitis       | 13%                       |
| • <i>Chlamydia pecorum</i> – enteritis*             | 30% prevalence            |
| • <i>Eimeria</i> spp – Coccidiosis                  | 18%                       |
| • <i>Yersinia</i> – weaner colitis                  | not surveyed, mainly Vic? |

\* = same species infect humans (ie: zoonosis risk)

## Recent Research with WA base - Murdoch

- 8 sites covering the Great Southern(3) plus ES sites(5).
  - Crossbred lambs in spring
  - Faecal test to detect presence of organism
  - Blood test to detect an immune response to the organism
  - Measured lamb growth rates and carcass at slaughter.
  - Compared performance of lambs shedding oocysts (infected) versus not shedding(not infected).
- Enteric pathogens examined:
- Giardia*
- Cryptosporidium*

## *Cryptosporidium* affects lamb growth and carcass weight

	Lambs shedding oocysts v not shedding
<i>Cryptosporidium</i>	
Weaning Wt	-2.8kg
Post-weaning Wt	-4.5
Slaughter Wt	-2.3
Carcass Weight	2.2-2.6 lower

## *Giardia* affects carcass weight

	Lambs shedding oocysts v not shedding
<i>Giardia</i>	
Weaning Wt	0
Post-weaning Wt	0
Slaughter Wt	0
Carcass Weight	0.6kg lower

## Comments and possible implications

- These protozoan infections probably reduce feed conversion efficiency, without necessarily inducing clinical disease(scouring).
- Production Cost is around \$12.50 per head in affected crossbred lambs.
- Potential for chronic disease state known for these organisms, therefore scenario of season to season carryover in sheep and in environment likely.
- No known/studied sheep treatments or farm based water treatments.
- What about Merino weaners and hoggets?
- Prevention – contamination of water sources. Does it work?  
What about existing infrastructure? Do troughs prevent? Are organisms in ground water?
- Zoonosis risk. Anyone know of farm based resident who has had chronic diarrhoea, abdominal pain and weight loss??

Watch this space