Juvenile stock in waterways

Supplementary information and resources

Landholders play an important role in protecting the health of Victoria's waterways. The presence of livestock, particularly juvenile stock, in waterways creates a risk to human and stock health. There are steps landholders can take to help manage the problem.

This brochure is intended for staff from catchment management authorities and other natural resource management agencies. It is accompanied by a shorter version specifically prepared for landholders[i]

Public health impacts caused by stock in waterways

Stock manure contains disease-causing microorganisms known as pathogens. Stock defecate more when standing in waterways to drink or when crossing waterways[ii]. They also stir up sediments and any pathogens that may be in the water.

If stock manure contaminates drinking water sources, and the required level of water treatment is not applied, pathogens can cause serious outbreaks of human disease.

Therefore, managing stock access to waterways upstream of drinking water off-takes is a priority for riparian management programs in Victoria[iii] [iv].

Stock health impacts

Poor quality water can adversely affect stock growth, lactation and reproduction. Contaminated water can also cause stock diseases such as Bovine Johne's.

The main problem pathogens

Two of the most common waterborne pathogens that can cause illness in humans are infectious species of *Giardia* and *Cryptosporidium* - both of which are protozoa, not bacteria. *Cryptosporidium* causes cryptosporidiosis, which is a very common infection of cattle[v] and can cause intestinal illnesses in humans, including diarrhoea, abdominal pain, bloating, nausea, headaches and fever. Symptoms can last from days to weeks and can be life threatening in people with weakened immune systems.

Cattle in a creek near Milawa, North East Victoria.
Credit: Leanne Wells, Department of Health and Human Services

Risks from juvenile stock manure

Juvenile stock, particularly calves, contain many times more of these human-infectious pathogens than adult stock. This is because juvenile stock take a while to develop resistance to the protozoan pathogens that cause cryptosporidiosis. Adult stock are generally resistant to the disease, except for lactating stock which also contain more of these pathogens than other stock.

Various studies show that pre-weaned calves (birth – 8 weeks of age), post-weaned calves (3 – 12 months) and heifers (12 – 24 months) all carry greater rates of human-infectious *Cryptosporidium* than adult animals[vi]. The highest rates of infection are typically found in pre-weaned calves (birth – 8 weeks of age).

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Table 1. Approximate average yield of human-infectious *Cryptosporidium* per day per host[vii]

Factor	Human sewage	Calf^ manure	Lamb manure	Dairy cow manure	Beef cow manure	Sheep manure
Prevalence of Cryptosporidium*	100%	50.3%	12.9%	11.9%	11.9%	5.3%
Human-infectious proportion*	100%	85%	70%	0.7%	0.7%	1%
Concentration of oocysts per litre or gram of manure	2,000/L	24,000/g	18,000/g	1,800/g	1,400/g	2,800/g
Average number of human-infectious oocysts shed per infected host per day	300,000	57,000,000	1,620,000	81,500	2,400	1,600

^ For the purposes of this table, calves are defined as animals that are less than 12 months of age.

* To interpret the table: 12.9% of lamb manure has Cryptosporidium and of that amount, 70% is human-infectious.

For example, Table 1 shows that for *Cryptosporidium*:

- The proportion of oocysts[1] is much higher in calf and lamb manure (18,000 to 24,000 per gram) than in adults (1,400 to 2,800 per gram).
- Calf manure is more likely to have *Cryptosporidium* than adult stock (50 percent compared 12 percent). For lamb manure, the difference is not as great compared to adult sheep but still significant (13 percent compared to 5 percent).
- The proportion of human-infectious *Cryptosporidium* is much higher in calf and lamb manure (85 percent and 70 percent respectively) than in cows and sheep (just 0.7 to 1 percent).
- Consequently, calf and lamb manure contains far more human infectious oocysts than the manure of adult stock. For example, calves shed an average of 57 million oocysts per day in their manure, compared to a beef cow, which sheds on average 2,400 per day or a dairy cow around 80,000 per day.

The potential public health issues associated with the higher pathogen concentrations in manure from juvenile stock, and their lactating mothers, are further increased by the common practice of locating juvenile stock near waterways due to the availability of water, productive pastures and the shelter from wind provided by riparian vegetation.

The amount of pathogens entering waterways is also highest then stock graze on paddocks adjacent to riparian land not long before or during a rainfall event that creates run-off.

Fenced riparian land and off stream watering for stock. Credit: West Gippsland Catchment Management Authority

[1] An *oocyst* is a thick walled structure in which each pathogen cell is 'housed' to transfer to a new host.

Juvenile stock in waterways

Native animals

Native animals (such as kangaroos) pose a much lower risk of contaminating drinking water supplies with their faeces as they are less likely to carry the human-infectious species of pathogens, and, overall, they shed much lower amounts of pathogens in their faeces.

For example, kangaroos typically have about 200 *Cryptosporidium* oocysts per gram in their faeces[viii] compared to the much higher figures for stock shown in Table 1.

Treating drinking water doesn't eliminate risk

Victoria's *Safe Drinking Water Act 2003* requires water businesses to manage risk to the drinking water they supply from the catchment and waterways to the customer's tap.

Most pathogens are rendered inactivate by the chlorine disinfection process commonly used by Victoria's water businesses to treat water for drinking. However, *Giardia* and *Cryptosporidium* are *not*. Other forms of treatment, such as filtration and/or UV disinfection (which is high cost and energy intensive), need to be used to remove or inactivate *Giardia* and *Cryptosporidium* from source water to make it suitable for drinking.

While the vast majority of town supplies in Victoria have treatment processes that include filtration and/or UV disinfection, a small number of supplies are not specifically set up to remove these pathogens.

Managing risks to water quality in the catchment reduces reliance on costly treatment processes. Better source water quality also means that treatment is likely to be more effective with fewer chemicals needed to produce a safe drinking water supply to communities.

The Australian Drinking Water Guidelines recommend managing water quality risks at source as much as realistically possible[ix].

The management of juvenile stock in waterways is the most cost-effective first intervention for the protection of drinking water catchments. Separating calves and lambs from waterways used for the supply of drinking water can reduce the pathogen risk to water supplies by 1,000-fold – similar to the reductions achieved by water filtration or UV disinfection systems.

Reducing the impact of pathogens

Landholders can reduce the pathogen impact by:

- Fencing waterways on or abutting their property. Preventing **all** stock access will have the biggest impact on reducing pathogen risk from stock defecating directly in waterways.
- Excluding only juvenile stock and their lactating mothers from waterways and paddocks that adjoin waterways, **until the juveniles have been weaned at about three to four months old**. Targeting juvenile stock and lactating mothers can significantly reduce the amount of pathogens entering the waterways.
- Not applying dairy effluent to paddocks being grazed by stock less than 12 months old to reduce infection rates.
- Excluding calves from pastures grazed by infected cows.
- Establishing permanent off-stream watering points.
- Maintaining groundcover in paddocks above 80 percent, for example through changing from continuous to rotational grazing. This limits selective grazing and improves the persistence of desirable perennial groundcover species. Better groundcover reduces pathogen run off to waterways.
- Locating stock laneways away from riparian land.
- Revegetating riparian land. This helps to minimise the movement of pathogens from paddocks to waterways.

Off-stream stock watering on the Middle Creek near Newstead (with the creek fenced out on the left).
Credit: Johanna Slijkerman, Department of Environment, Land, Water and Planning

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Further benefits of managing juvenile stock access to waterways

Healthier and more productive stock

Stock water from troughs is of better quality and much less likely to contain pathogens than water consumed directly from waterways. Landholders benefit from the improved water quality through healthier and more vigorous stock.

Stock will drink more water if it is of better quality, leading to an increase in pasture use and feed intake, resulting in stock weight gains or, where relevant, increased milk production[x] .

Other potential benefits for landholders include increased property values, wind protection for stock, easier stock management around waterways with reduced risk of stock injury and loss, and decreased soil erosion.

Healthier environment and improved social values

There are many benefits to the environment from reducing juvenile stock access to waterways, including improved water quality and native riparian vegetation, which provide better habitat for native animals and fish. Healthy riparian land also provides a corridor for the movement of native animals and plants, and stability for river banks. Riparian land also provides important recreational opportunities and protects cultural values, especially at sites of significance to Traditional Owners.

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Further reading

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