Improving effluent pond treatment systems (6-3)

Increasing cow numbers and intensifying by adding pads and barns without upgrading the effluent systems can lead to poor system performance. See Farmfact 6-2 to determine if your effluent oxidation pond treatment system is the right size.

Reduce effluent volume

Minimising the volume of dairy shed effluent is very important. Reducing effluent volume will allow the effluent to be treated to a higher standard and will allow pond systems to continue to be acceptable, economical and practical.

One of the major contributors to effluent volume is water. Not only does water increase the volume of effluent that you have to treat, it also:

- Dilutes the amount of micro-organisms that live and work in your ponds treating the effluent
- Decreases the temperature of the ponds
- Reduces the retention time by ‘flushing’ the effluent through the system too fast

While not every regional council promotes storm-water diversion, it is a wise move as it can dramatically reduce the amount of rainwater entering the effluent system.

Consider an average combined yard and roof area of 250m². An annual rainfall of 1200 mm will add 300m³ (300,000 litres) of water to the pond system. Without storm-water diversion you will need much bigger ponds or an additional disposal system.

Undersized anaerobic pond

Undersized anaerobic ponds are one of the most common reasons for poor performance of effluent pond treatment systems. If the anaerobic pond is undersized the retention time is shorter than that required for adequate treatment and the pond system fails.

To improve the situation of an undersized anaerobic pond:

- Increase the size of your anaerobic (first) pond. Either increase the size of the existing pond, or add another anaerobic pond until your total anaerobic volume meets the recommended size for your herd plus any additional effluent inputs. (e.g. feed pads)
- Add on another treatment system such as applying effluent to land. Use your effluent ponds as storage and irrigate from the aerobic (second) pond.

Ineffective baffle or T-piece

By allowing solids to move from the anaerobic pond to the aerobic pond, the aerobic capacity of these ponds is overloaded and essentially turns them into another anaerobic pond.

To retain solids in the anaerobic pond ensure that a baffle or tee is set up correctly on the discharge pipe. The position of the inlet and outlet pipe is very important for optimizing the capacity of your ponds. The inlet should be diagonally opposite the outlet pipe.
Undersized aerobic pond(s)

An undersized aerobic pond (assuming that the anaerobic pond is adequate) results in elevated faecal bugs and ammonium nitrogen levels in your wastewater.

To make improvements:
- Increase the size of your existing aerobic pond or add another pond to the system. The additional pond should be at least half the surface area of the aerobic pond (second pond).
- Apply the effluent to land rather than discharging to a waterway. Land application is generally the preferred option of regional councils. The pond system can provide an excellent storage facility.

Pond system overloaded by other effluent sources

The addition of effluent from the following sources, to an existing system, is likely to result in overloading and contamination of receiving water:
- Standing cows on the farm dairy yard for extended periods
- Feed pad effluent
- Stand-off pad effluent
- Silage stack leachate and runoff

These additional sources will need to be factored into the design and may require a system upgrade.

Constructed wetlands

Wetland plants provide a good wildlife habitat as well as water purification. Constructed wetland systems are designed to simulate and optimise the filtering and organic matter breakdown processes that occur in natural wetlands. During summer months, such a system may even result in zero discharge to waterways, due to evapotranspiration of water from the wetland.

The advantages of constructed wetlands are that they:
- Have the ability to treat a wide range of contaminants
- Have the ability to handle shock loadings of effluent
- Do not normally rely on electricity or machinery
- Have aesthetic value and provide wildlife habitat
- Require minimal ongoing capital expenditure and maintenance once established
- Operate successfully over a wide range of climate regimes (as long as cold temperatures do not affect the functioning of the pre-treatment ponds)

Constructed wetlands are not 'stand-alone' treatment systems, they rely on the oxidation pond system working adequately first. They are designed to polish effluent flowing from a pond system before it reaches a surface waterway.

Consider mechanical aeration

Mechanical aerators:
- Introduce air into the effluent.
- Expose more effluent surface area to the air. This is commonly achieved by spraying effluent into the air or agitation of the effluent.
Chemical and biological additives

Several kinds of additives are available and are claimed to dissolve and disperse solids build-up, particularly crusting. These additives vary in their effectiveness. Current evidence shows that they are not a long-term solution to reducing sludge and crusting problems.

Better management of effluent pond systems

- Divert storm-water from the farm dairy and prevent water run-off from the land entering the pond system
- Prevent excessive chemical from entering ponds (such as hoof treatment and cleaning chemicals)
- Prevent other wastes, such as gloves, syringes, plastic bags, tail switches etc. entering the ponds. These can block the pipes and reduce the effectiveness of the pond system.
- Ensure the ponds are lined and sealed (not leaking)
- Ensure that groundwater is not entering through the pond floors. If groundwater is entering then effluent will be exiting in this way too
- Ensure that the pumps and other machinery don’t damage the liner. Contractors should be made aware that a liner is present.
- Ensure pipework is installed correctly. Inlet and outlet pipes placed in the wrong position can result in short-circuiting effluent through the system, rather than optimizing retention through pond capacity.
- Prevent damage to pipework and embankments.
- Follow an effective maintenance programme, including desludging, weed control and care of pipe work.
- Situate effluent ponds at least 45m from the farm dairy for food safety reasons.