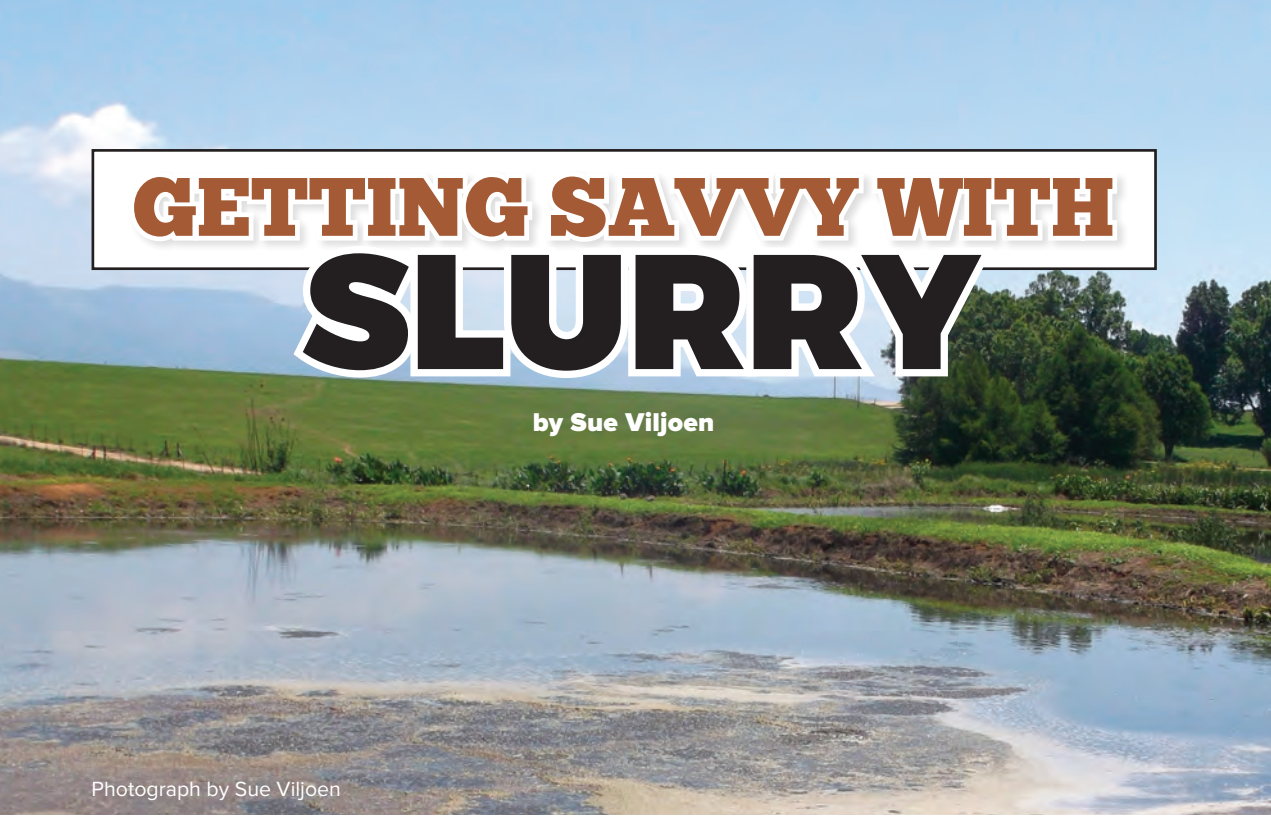


GETTING SAVVY WITH SLURRY

by Sue Viljoen

Photograph by Sue Viljoen

Is slurry handling and waste management the weakest link in your business? Is manure the source of your manager's migraine? Slurry handling is a very necessary and unavoidable component of any dairy operation, but it is often the activity where there is the biggest room for improvement. Many farms have had to expand over the years in order to remain viable, and the original infrastructure is now inadequate for the herd size and effluent handling requirements.

The World Wide Fund for Nature South Africa (WWF-SA) appointed consulting engineers, EVN Africa, in 2016 to provide recommendations to 14 volunteer dairies from the Karkloof, Mooi River, and Little Mooi irrigation boards on the effectiveness of their current waste water and storm water handling practices and the infrastructural and operational requirements for improving these systems. This article summarises components of a final, overall report produced by EVN Africa, which is available from WWF upon request.

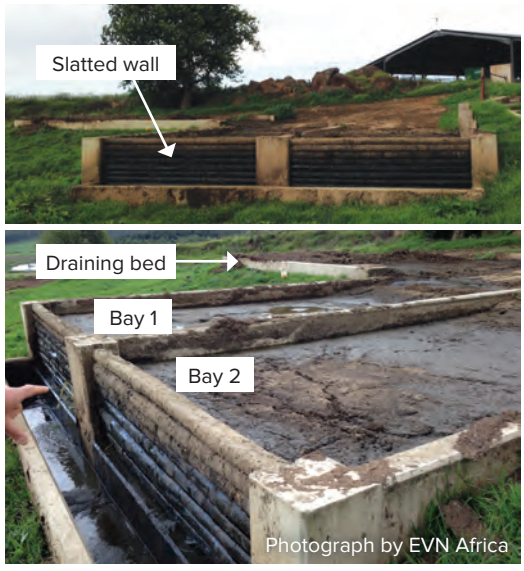
GETTING THE BASICS RIGHT

The use of multiple slurry dams (also referred to as slurry ponds or effluent lagoons) for capturing and storing waste water produced in a dairy parlour, holding yards, feeding pads, or calf pens is a fairly common practice in South Africa. Slurry dams facilitate separation of the solid and liquid fraction of slurry through settling, which normally significantly improves water quality with each dam stage – if the dams are constructed correctly and are functioning as they should.

Table 1: The opportunities and challenges of slurry dams.

OPPORTUNITIES	CHALLENGES
Good water supply, rich in nutrients, to service nearby pastures or crops. Can substantially reduce fertiliser requirements.	Settling ponds have a tendency to trap and retain valuable nutrients, such as phosphorus and nitrogen, within the lower sludge layers, which may be difficult to access.
Opportunity to recycle water for certain wash down activities (if water is of acceptable quality for intended use), thereby reducing water consumption.	Requires agitation to access valuable nutrients and enable application to fields.
TOP TIP: Separate storm water from waste water – this reduces strain on slurry storage facilities.	Ponds need desludging every few years (if solids are not separated) and ongoing maintenance.

Figure 1: Typical weeping wall system with two sludge bays.



Emptying slurry dams and utilising or disposing of the contents can pose both a challenge and an opportunity.

WEEPING WALLS

A weeping wall is essentially a slatted wall, made from wooden poles, which acts as a passive filter and keeps back effluent solids while liquids pass through the gaps between the poles. The solid waste portion that is held behind in a concrete bay can be used as manure once dried. Although the separation process is passive, removal of the solid waste from the slurry beds is labour intensive. The design of these structures needs to be customised for each farm operation and adequate for the number of animals serviced. The slurry pond can be located next to the weeping wall, or the liquids from the wall can be collected and conveyed to a more distant pond by a channel or pipeline.

SEPARATING SOLIDS

Separating solid and liquid waste fractions is more useful for farms that do not utilise contractors to empty their ponds, as it reduces the storage capacity required and improves the quality of the final effluent liquid. Separating waste fractions also reduces the corrosive effects of waste water on irrigation system components as the injected liquid contains fewer solids.

MECHANICAL SEPARATORS

Mechanical separators utilise mechanically driven systems to separate the slurry into solid and liquid fractions, with a number of different options on the market. There are various factors to consider when opting for a mechanical solution. For example, mechanical separators are very efficient, but require more capital investment than more passive means of separation, and breakdowns can pose a big challenge to daily operations.

CONTINGENCY PLANS

No matter how well an effluent system is designed and managed, breakdowns are almost guaranteed! Contingency plans and procedures for emergency breakdowns are essential and should be written up and visible to dairy staff. A contingency plan should take into account power disruptions, human error, pump breakdowns, dam overflows, breaches, and conveyance blockages.

> **“On-farm storage capacity is considered to be adequate if three months of slurry can be stored without exceeding the minimum prescribed freeboard of 30 cm for open storage facilities.”**

In the event of unforeseen circumstances, when slurry dams overflow, the best mitigation option is to have a vegetated buffer downstream of the last stage dam overflow – ideally this should consist of natural vegetation, but pastures do work. Such buffers can absorb nutrient-rich liquids and mitigate the impacts of slurry making its way into a stream, river, or wetland.

DISPOSAL BY IRRIGATION

Irrigation of slurry onto fields is fairly common practice on pasture-based farms. Ideally, slurry should be applied in the drier months as there is the risk of runoff to streams or leaching into groundwater when soils are saturated. For maximum nutrient uptake, slurry should be applied when the pastures are actively growing. Slurry is usually spread on the most recently grazed pastures and stock should only be grazed on those fields at least three weeks after application. Keep in mind the provisions of the Water Act (36 of 1998) for disposal of waste by irrigation, and do not irrigate within 100 metres of a watercourse as depicted below.

CONCLUSION

Now is the time to review your slurry handling systems and make the improvements that are necessary before this domain is more strictly enforced.

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Figure 2: Guideline of distance for slurry application from watercourse edge.