Farm Dairy Effluent Irrigation Evaluations

Larall 1

System details

- Single pond system
  - Effluent discharged to land via long laterals
  - Effluent into system appears well settled
  - System automatically turns off after 2 hours

- Long laterals with Rainbird sprinklers various nozzle diameters by design
  - Used to apply all effluent generated from the shed
  - System has three sections controlled by manual valves
  - Each section has about 14 sprinklers with ten positions
  - Sprinklers run for 2 hours in each position
  - Overlap between adjacent positions unknown

- Soils are variable; silt loam
  - No ponding and runoff on day of visit. None anticipated except if pipe failures

- Irrigation
  - Farm is not irrigated

Figure 1. Effluent irrigator sprinklers operating.

Figure 2. Effluent pond and pump

Consent Details

Permitted Activity

Effluent Irrigation Evaluation

Larall long lateral sprinklers

This irrigator was applying effluent at low rates, within the soil's infiltration and water holding capacities. The design allows significant storage, and rapid application over large areas. A summary of system performance is given in Table 1.

Table 1: Summary of Effluent Irrigation Performance

Stationary Sprinkler	**180kPa**	
Wetting Diameter	34	m
Wetting Area	908	M^2
Wet Area per Shift	12710	m^2
Mean Application Rate	1.56	Mm/hour
Max Application Rate	3	mm/h
High Quarter App Depth	1.9	mm/h
Low AppDepth	1.2	mm/h
DU High	1.25	
DU Low	0.80	

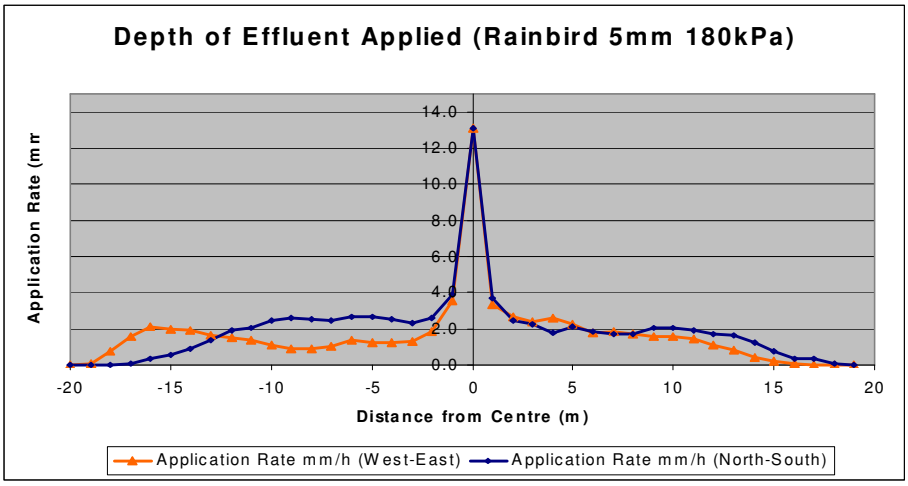

Figure 2. Effluent application pattern measured at original pressure (no overlap between adjacent sites)

In the graph (Figure 2), the depth of effluent measured in the field is shown as the depth applied in one hour (equivalent to rainfall intensity). The two lines represent two transects measured at right angles to one another across the area served by the gun.

The peak at the centre of the application pattern represents effluent that was captured under the sprinkler body. While this is high relative to the rest of the wetted area, it is still low and represents a very small proportion of the overall application area.

The application uniformity of the sprinkler tested was 0.80. This is generally considered very good. The calculations included the area at the perimeter where only very low rates of application were measured. If these were ignored, the uniformity would increase still further. It is reasonable to assume other sprinklers will have similar performance if not damaged or blocked.

The main difficulties in determining an overall field uniformity value for this system are not knowing where sprinklers will be placed each shift or how much variation in shift run time occurs. The Overlap between adjacent positions will vary. However, given low application rates the risk of excess application events is minimal.

Recommened Improvements

This system appears to working well, although only one sprinkler could be tested before the effluent supply ran out. The sprinkler tested was operating at the correct design pressure. Visual inspection of the rest of the system indicated sprinklers were in good order and trajectories and wetted radii as expected.

The design allows for flexibility of application, and allows for effluent to be stored in wet conditions. It is relatively simple to manage, and has low risk should mistakes be made by operators.