The survival of Faecal Indicator Organisms (FIOs) in soil following dairy slurry application to land by surface broadcast and shallow injection

N.M Bulmer[1], C.J Hodgson[1], D.R Chadwick[1]
[1]Institute of Grassland and Environmental Research, North Wyke Research Station, Okehampton, Devon, EX20 2SB

Fig. 1.Shallow injection slots, slurry applied at a rate of 45m³ ha^{-1}

Fig. 2.Broadcast applied slurry, at a rate of 45m³ ha^{-1}

Fig. 3 Disc cutter used to make shallow injection slots

INTRODUCTION:

The amended Bathing Waters Directive (2006/7/EC) of February 2006 saw the introduction of more stringent microbial parameters for both inland and coastal waters. Two microbial parameters are now required to be examined; Intestinal Enterococci and *Escherichia coli*, which are Faecal Indicator Organisms (FIOs).

Approximately 90 million tonnes of livestock manures are recycled to agricultural land in the UK annually, which represents a potential source of FIO export to surface waters.

Fig.4 Shallow injectors

AIM:

Shallow injection of slurry is acknowledged to be an effective method to reduce ammonia emissions compared to surface broadcasting and this slurry application technique may become more common should EU targets become more stringent. It is important to determine the impact of shallow injection on FIO survival, since injection into the soil reduces the effects of desiccation and UV on survival compared to surface applied slurry.

Therefore, the aim was to investigate the survival of FIOs within dairy cattle slurry at the plot scale.

METHODS:

Three soil core samples (2cm depth) were taken from each of the fifteen 4m² plots

- 5 surface broadcast
- 5 shallow injection

(both of these had fresh slurry applied at a rate of 45m³ ha^{-1})

- 5 controls (with no slurry addition)

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- Cores from each plot were pooled and homogenised, and 5g was added to 45ml of ¼ strength Ringers solution and shaken for 30 mins at 300rpm.
- After serial dilution, bacterial concentrations were determined in duplicate by membrane filtration following standard methods (APHA, 2002 and E A Standard Methods 2002).

RESULTS:

Application methods influenced the survival rates of *E.coli,* which survived longer when applied to land via shallow injection than broadcast application (Fig. 5). While intestinal enterococci showed similar survival characteristics when applied to land via shallow injection and broadcast application (Fig. 6)

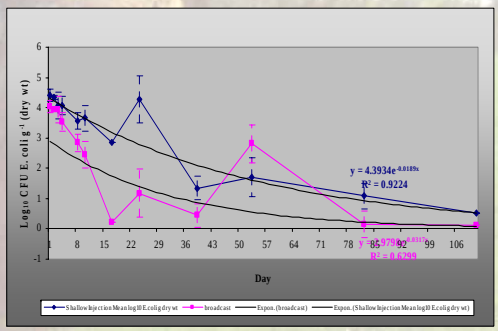

Fig. 5 The survival of *E.coli* in soil is greater following shallow injection than broadcast application

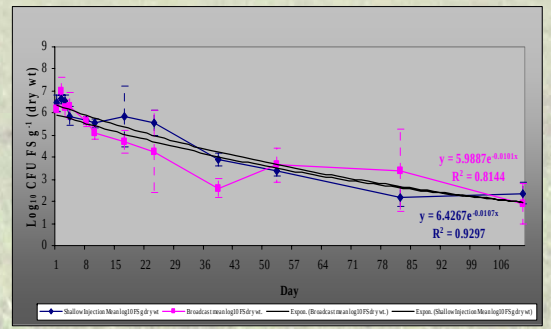

Fig. 6 Interestingly, the survival of intestinal enterococci In soil shows no difference between shallow injection and broadcast application

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CONCLUSION:

Although effective at reducing ammonia emissions, it can be seen that *E coli* survive for longer when slurry is applied to land via the shallow injection method compared to surface broadcast application.