

Effect of harrowing and watering on disappearance of dung pats in pastures

Verwer C.¹, Lenssinck F.², Van Schooten H.³, Philipsen A.P.³ and Van Eckeren N.^{1*}

¹Louis Bolk Institute, 3972 LA Driebergen, the Netherlands; ²Peatsoil Innovation Centre, 3474 KM Zegveld, the Netherlands; ³Wageningen UR Livestock Research, 8200 AB Lelystad, the Netherlands; n.vaneckeren@louisbolk.nl

Abstract

Dung pats in pastures limit grass production, and lead to grazing losses and a lower eco-efficiency in dairy systems. Immediate harrowing after grazing could help to break up the pats and distribute the manure more evenly. However, in the absence of rain this may result in flattened, manure-smear grass. Harrowing after some days of dung deposition may overcome smearing of the grass. Watering the pasture immediately after harrowing can help to wash the manure off the foliage. In a field experiment we compared the disappearance of (artificial) dung pats in the following treatments: (1) dung pat – untreated (control); (2) harrowing immediately after deposition (day 0); (3) harrowing + watering (10 mm) immediately after deposition (day 0); (4) harrowing at 7 days after deposition; and (5) harrowing + watering (10 mm) at 7 days after deposition. The results after three weeks show that harrowing fresh dung pats (day 0) did not significantly increase the disappearance of dung (43% disappeared versus 40% disappeared of the untreated pats). Harrowing 7 days after deposition resulted in a significant lower dung disappearance (31%) than observed for the untreated pats (40%), even when watered (34%). The best result was obtained when fresh dung pats were harrowed in combination with water at day 0 (61% disappearance).

Keywords: dung pats, pasture, harrowing, watering, dry matter disappearance

Introduction

Fouling of pastures by dung pats is an important problem on dairy farms. A cow produces around 8-10 dung pats per day. Depending on the grazing management most of the dung pats are deposited on the pasture. Dung pats reduce the surface of grass growth and cows reject herbage around pats, which decreases the area on which cows forage and lowers the utilization of the pasture (Bosker *et al.*, 2002; Castle and MacDaid, 1972; Dohi *et al.*, 1991). Moreover, the pats form a breeding medium for cattle pests (Castle and MacDaid, 1972). Rapid disappearance of dung pats enables faster recycling of nutrients and their utilization, better grass growth and a faster recovery of the grass surface. Because of these effects a rapid disappearance of cow dung pats is desirable for farmers. A wide range of biotic and abiotic factors and grassland management measures can influence the degradation and disappearance of dung pats (Barth *et al.*, 1994). One management measure is harrowing. Harrowing immediately after grazing could help to break up the pats and distribute the manure more evenly. However, in the absence of rain this may result in flattened, manure-smear grass. Harrowing after some days of dung deposition may overcome smearing of the grass. Harrowing in combination with watering the pasture immediately after harrowing can help to wash the manure off the foliage. The objective of this experiment was to study the effect of timing of harrowing and watering on the disappearance of dung pats.

Material and methods

In a field experiment with a randomised block design we compared the following treatments: (1) dung pat – untreated (control); (2) harrowing immediately after deposition (day 0) (3) harrowing + watering (10 mm) immediately after deposition (day 0); (4) harrowing at 7 days after deposition; and (5) harrowing + watering (10 mm) 7 days after deposition. Harrowing was carried out with a commercial

chain harrow. The experiment was carried out in July 2014 at VIC Zegveld in the western peat soil region in the Netherlands. The dung used for the experiment was collected from a herd of cows on a fresh grass diet. Dung was collected direct from the cows' rectums. At the start of the experiment the dung was thoroughly mixed mechanically. Before placement of each artificial dung pat, the grass was mowed to a height of 7 cm and the field was irrigated. There were five pats per treatment. Two kilos of dung per pat were weighed and poured into round pie tins in order to provide the same shape and weight of each dung pat. Wire netting (mesh size 1 cm) was placed underneath each dung pat to assist with their recovery. The dung pats were harvested and weighed at 21 days after placement to examine the rates of dung decomposition. There was no rain during the experiment.

Results

The mean rates of disappearance of dung (as % of dung dry matter (DM)) for each treatment are presented in Table 1. The results show that under these circumstances (peat soil and dry weather), harrowing the fresh dung pats (day 0) did not significantly increase the disappearance of dung. The combination of harrowing with watering at day 0 resulted in the most significant increased rate of disappearance of dung pats. Harrowing 7 days after deposition, with or without watering, resulted even in a significantly lower rate of dung disappearance compared with the untreated pats.

Discussion

The highest dung pat disappearance was recorded with direct harrowing and watering at the day of deposition. Direct harrowing at day 0 without watering had no additional value to the control. Watering may have had not only a washing effect but also a moistening effect on the dung pats. In the model for dung disappearance of Vadas *et al.* (2011), moisture of the dung was a very important factor. However, watering at day 7 did not increase the dry matter disappearance compared with just harrowing at day 7. Both treatments had even lower rates of disappearance than the control. Apparently, watering has little or no effect when the dung pat is no longer fresh. Harrowing a dung pat after 7 days has a negative effect on its disappearance. An explanation for this could be that after 7 days the dung pat is drier, and that harrowing the dry dung pat reduces the contact between the dung pat and the soil surface, which inhibits the decomposition processes by earthworms and other soil biota.

Conclusions

Harrowing in combination with watering dung pats at day 0 after deposition was shown to enhance the disappearance dung pats at three weeks after their deposition. Direct harrowing and harrowing after 7 days did not increase the disappearance rate of dung pats.

Table 1. Disappearance of dung (as % of dry matter (DM)) 21 days after placement.

| Treatment | Disappearance of dung (as % of DM) ¹ |
|-------------------------------|---|
| Dung pat-untreated control | 40 b |
| Harrowing at day 0 | 43 b |
| Harrowing + watering at day 0 | 61 a |
| Harrowing at day 7 | 31 c |
| Harrowing + watering at day 7 | 34 c |

¹ Values followed by the same letter in a column are not statistically different at the 5% error level.

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