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SPREADING SLURRY AND THE ACCEPTABILITY OF SWARDS TO CATTLE

Introduction

Timing and rate of slurry application are critical if maximum fertiliser value is to be obtained. Ideally, grassland should be dressed in early spring, or after harvesting during the season, at rates which relate to the N, P, K content of the slurry and to the fertiliser requirement of the grass. 'Topping up' with artificial N is usually required to achieve a balanced fertiliser application.

The refusal of livestock to eat tainted herbage is also important in deciding the rate and timing of slurry applications to grassland. Rejection, and subsequent wastage of herbage, is normally associated with the dung dropped by cattle at pasture. The extent of the rejection depends on the stocking rate and availability of untainted pasture. The avoiding reaction is thought to be shown when the smell of the dung is strong. Attempts have been made to mask the smell, with molasses for example, or to condition cattle to eat tainted grass by exposing them to slurry-treated forage before turn-out. In practice there is little virtue in persuading cattle to eat from swards recently tainted with their own excreta because of the risk of transferring disease organisms to healthy stock. Research at the Institute for Research in Animal Diseases has demonstrated the need to leave at least four weeks between spreading and grazing to avoid danger from salmonella. Work at the National Institute for Research in Dairying suggests that a longer period must elapse to ensure efficient herbage utilisation. Except in extreme conditions cattle will graze slurry dressed pasture but their intake, and possibly performance, can be reduced.

SPREADING SLURRY ON GRAZING PADDOCKS

A grazing experiment was carried out with 13 month old Friesian heifers. The animals were given a choice between pasture dressed with slurry at different rates. The experiment was designed as a sensitive test to see if the heifers could detect, or distinguish between, swards spread with different amounts of slurry and, if so, for how long. Small grazing paddocks were divided into four equal sectors and slurry was applied to each sector at 0, 25, 50 or 100 t/ha (0, 10, 20 or 40 t/ac) in mid-March. The paddocks were grazed for four day periods in May, seven weeks after spreading slurry, and re-grazed in mid-June thirteen weeks after spreading slurry.

The main effect of the slurry was to decrease herbage dry matter production per unit area, but to increase the height of the sward. By the second grazing this slight smothering effect of the slurry had disappeared and the amount of herbage in each sector was proportional to the amount of slurry applied. The heifers not only detected the lightest slurry dressing seven weeks after spreading, but also distinguished between different rates. Clean pasture was much preferred even when the slurry remained only as a fibrous mat at ground level on the other treatments. Areas without slurry were closely cropped before significant quantities of grass were removed from the slurry dressed swards. Towards the end of the grazing period, when very little grass remained on the no-slurry swards, the heifers spent as much time grazing here as on swards with slurry, where there was ample grass. Over the four days 94% of the available herbage was taken from the control compared with only 41% when 100 t slurry/ha was applied. The cattle also preferred not to lie down as frequently on the swards with much slurry! The preference for grass with little or no slurry, apparent seven weeks after spreading, had almost disappeared when the paddocks were re-grazed six weeks later. The percentage of available herbage removed by the heifers was similar for the 0, 25 and 50 t/ha slurry treatments. Slightly less was taken where 100 t slurry/ha had been applied thirteen weeks previously, even though there was initially more grass available. The more slurry applied, the longer the delay required between spreading and satisfactory grazing.

These experiments established that cattle can detect slurry for several weeks after spreading (more than seven, but less than thirteen in our conditions), distinguish between different rates of application and avoid slurry dressed areas if possible. In practice the important questions are: "do cattle eat less if the only grass available is tainted", and "is animal performance impaired?" Experiments at the Rowett Research Institute showed a reduction in herbage intake by milking cows on slurried pasture at comparatively high stocking rates. Liveweight, rather than milk yield, was affected. The following experiment was carried out at NIRD at lower stocking density, using Friesian heifers. Paddocks were dressed with different amounts of slurry between 0 and 100 t/ha (0 and 40 t/ac) in either January or March and grazed by heifers at intervals from late April to August. The fertiliser effect of the slurry was effectively masked by applying artificial nitrogen so that the amounts of grass on each paddock were similar. Daily herbage dry matter intake per heifer ranged from 5.2 kg to 6.3 kg and was unaffected by the slurry treatments. Cattle intakes were similar whether or not slurry had been applied in either January or March. The pattern of their grazing behaviour was, however, affected by the slurry. Continuous recording of grazing behaviour showed that the time between lowering the head to start grazing and raising it again, i.e. the grazing bout length, was shorter on plots where slurry had been applied at the high rate in March. This suggested that the animals were more selective in their choice of herbage on slurried pasture. Stocking rate was relatively low, especially at the beginning of the season, and it appeared that the cattle could maintain satisfactory herbage intakes by selectively grazing from the top of the sward. Grazing pressure tended to increase later in the season because less grass was available, but by this time the adverse effects of the slurry had disappeared. As in the previous experiment the heifers on paddocks with slurry spent less time lying down and less time ruminating.

SLURRY INJECTION

An effective means of overcoming herbage rejection problems in a grazing situation is to use new machinery for injecting slurry directly into soil. Slurry injectors were developed primarily as a means of avoiding odour, especially when pig slurry is used on land bordering urban areas.

To test the injector a herd of Friesian cows were divided into three groups in spring and grazed on paddocks which were either injected with slurry at 25 t/ha (10 t/ac) eight weeks previously, or had slurry spread on the surface at the same time and rate, or received artificial N fertiliser. Actual rates of slurry application were adjusted to give about the same amount of nitrogen as the artificial fertiliser and supplied in total 68 kg

N/ha (54 units/ac), 12 kg P/ha (9.6 units/ac) and 55 kg K/ha (44 units/ac). Injection depth averaged 10 cm (4 inches) and the paddocks were rolled 24 hours later to close the slits. Spreading slurry on the surface reduced the daily herbage intake of the cattle by 30%, even though eight-nine weeks elapsed between spreading and grazing. There was a slight drop in milk yield from cows on these paddocks, but the experiment did not continue long enough to detect significant differences. In contrast, animals grazing injected paddocks ate as much grass as those on paddocks where no slurry was applied. Observations on the cattle showed that grazing behaviour was modified by the presence of slurry.

When the cattle entered the paddocks after morning milking, almost every animal started grazing, but within 2 hours most were lying down ruminating. Most of the cattle on the control paddocks stopped grazing after an hour, but those where slurry had been either injected or spread on the surface grazed for 30 and 60 minutes longer respectively. Animals grazing where slurry had been spread on the surface walked about more while grazing and appeared to take smaller bites of grass, perhaps in an attempt to avoid the smell of the slurry close to the ground.

During the rest of the season, one day paddocks were grazed at 28 day intervals by the whole herd. Normally the paddocks received 60 kg N/ha (48 units/ac) as ammonium nitrate after each grazing. In this instance the fertiliser application in June and August was replaced by slurry injected at 25 t/ha (10 t/ac) on half the number of paddocks. There was little difference between the amount of herbage produced and in the amount taken by the cows on paddocks which received a total of 50 t slurry/ha (20 t/ac) and those which had received only artificial fertiliser. Grazing behaviour was unaffected by injected slurry.

CONCLUSIONS

Slurry should be spread at rates which relate to the fertiliser requirement of the crop. Limiting applications in this way will not only make the best use of its fertiliser value, but also minimise the delay needed between spreading and grazing to ensure efficient herbage utilisation. The more slurry applied, the longer the cattle will detect its presence. Taking the first cut for conservation is probably the wisest policy in these circumstances.

A low stocking rate during the first grazing after spreading slurry allows cattle to be selective in their choice of herbage. Higher grazing pressure may force cattle to eat tainted herbage, but there is a disease risk. Modifications in the grazing behaviour allow cattle to maintain satisfactory intakes under "adverse" sward conditions. For example, when slurry was injected into pasture grazing behavior was affected, either because the cattle could still smell the slurry, or because injection altered the nature of the sward, but intakes were unaffected. In the same experiment, however, when slurry was spread on the surface, modifying grazing behaviour was not sufficient. Even though the cattle spent longer grazing, they ate less grass. Reduction in herbage intake is known to affect animal performance. We do not yet know whether animal performance on slurried pasture is adversely affected by the modified behaviour, which can often involve the animal in extra effort to obtain the same amount of food, or by any associated stress.

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