Rejection of grass around dung pats; influence of smell, taste or both?

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Abstract

Dung pats reduce the surface of grass growth and cows reject grass around these pats, which decreases forage area and lowers the utilization of the pasture. The question is whether the rejection is due to smell, taste or both. In four grassland plots four treatments (six dung pats per treatment) were assigned with artificial dung pats; (1) untreated (control), (2) smell absent, taste present, (3) smell present, taste absent, (4) smell absent, taste absent. Three weeks after introduction of the dung pats, 10 cows were introduced in a plot during daytime on four consecutive days (new plot each day). Grass length and grazed surface around the dung pats was measured before and after grazing. The results show that smell, and the combination of smell and taste has a negative effect on the intake of grass. These results are of interest for dung pat management on grassland.

Keywords: dairy cows, dung pats, grass surface, pasture utilization

Introduction

Fouling of pastures by cow-dung pats is an important problem at dairy farms. A cow produces around 8 till 15 dung pats per day (Castle and MacDaid, 1972; MacDiarmad and Watkin, 1972; Dohi *et al.*, 1991), each covering an area of approximately 0.05-0.07 m^2 (MacDiarmad and Watkin, 1972). Cows reject herbage around pats, for more than a month, 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). In general pasture studies focussed on the effect of smell of the dung (Bosker *et al.*, 2002; Marsh and Campling, 1970) whether or not in combination with visual appearance (MacDiarmad and Watkin, 1972). In this study we investigated whether cows reject grass around dung pats due to smell, taste or both.

Materials and methods

The experiment was carried out in the growing season of 2014 in the Western peat soil district in the Netherlands. Three days prior to the start of the experiment fresh dung was collected direct from the cows' rectum, mixed and stored at 7 °C. The cows from which the dung was collected received a fresh grass and concentrate ration, and were not treated with anthelmintics and antibiotics. The experiment was set-up as a randomized complete block design with 4 pasture plots of 6.5×6.5 m as blocks and dung treatment as plot (4 treatments, 6 replicates). Dung was weighted and poured into round pie tins in order to provide the same shape of each dung pat. The following treatments were assigned; (1) smell present, taste present (control), (2) smell absent, taste present, (3) smell present, taste absent, (4) smell absent, taste absent. The absence of smell was realised by covering dung pats during grazing. The absence of taste was realised by placing the dung pats in a PVC tube that was 20 cm inserted in the ground (no nutrient leakage). Three weeks after introduction of the dung pats, 10 dried off Holstein Friesian dairy cows were introduced in a field plot between 8 AM and 5 PM on four consecutive days (repetition; new field plot each day; around 110 kg dry matter cow^{-1} per 9 hours, *ad libitum* access to water). During grazing the behaviour (walking, resting, grazing, ruminating and displacement) of the cows was observed. Cow dung excreted during the observation period was immediately removed after the observation period. Three

weeks after the observational period (round 1) the experiment was repeated in the same plots with the same cows (round 2). Grass length around the dung pats (distance of 5 cm to dung pat) was measured before and after grazing (4 quartiles per pat). From this the grazed grass length was calculated. Grazed surface around the dung pats was measured after the grazing period with project developed software. Grazed grass length and grazed surface around the dung pats were analysed by analysis of variance (ANOVA) using SPSS 18.0.

Results

The uptake of tall grass differed significantly (P=0.043) between the two rounds. In round 1 grazed grass length was significantly (P≤0.0001) different for the first observation day and no treatment effects were revealed. From the behaviour of the cows (excessive walking through the plot) it could be concluded that the cows had to get used to the experimental set-up. For this treatment effects on grazed grass length were analysed for observation day 2, 3 and 4. No differences existed in grazed grass length, therefore the data of these days were combined and analysed for treatment effects. The grazed grass length of the treatments in which smell was present was significantly (P≤0.05) lower than treatments in which both smell and taste were absent.

In round 2 the uptake of tall grass differed significantly (P≤0.000) between the second observation day in comparison to the other days. Day 2 was characterised by temperatures around 35 °C, in which the cows were not motivated to graze. For reasons of animal welfare the cows were housed indoors before 5 PM. For this reason treatment effects on grazed grass length were analysed for observation day 1, 3 and 4. No differences existed in grazed grass length, therefore the data of these days were combined and analysed for treatment effects. No treatment effects were found (P≤0.119). The grazed grass length results are presented in Figure 1.

Differences in grazed surface around the dung pats were analysed per round, as this parameter was not measured in round 1 on the first observation day. Within round 1 and round 2 no significant differences existed between the plots (P≥0.05). Therefore, for both rounds, data were combined for all plots and tested for treatment effects. No treatment effects were found in round 1 (P=0.082). In round 2 grazed surface around the dung pat of the control treatment was significantly (P≤0.000) higher than the other treatments. Results on grazed surface around dung pats are presented in Figure 2.

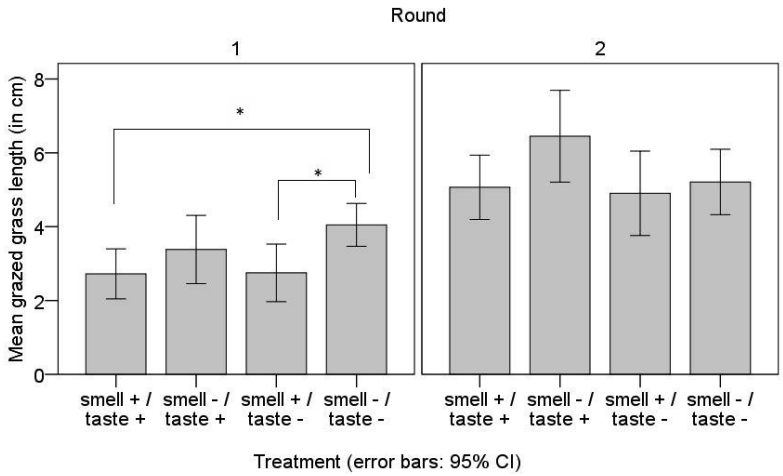

Figure 1. Mean grazed grass length of tall grass around dung pat.

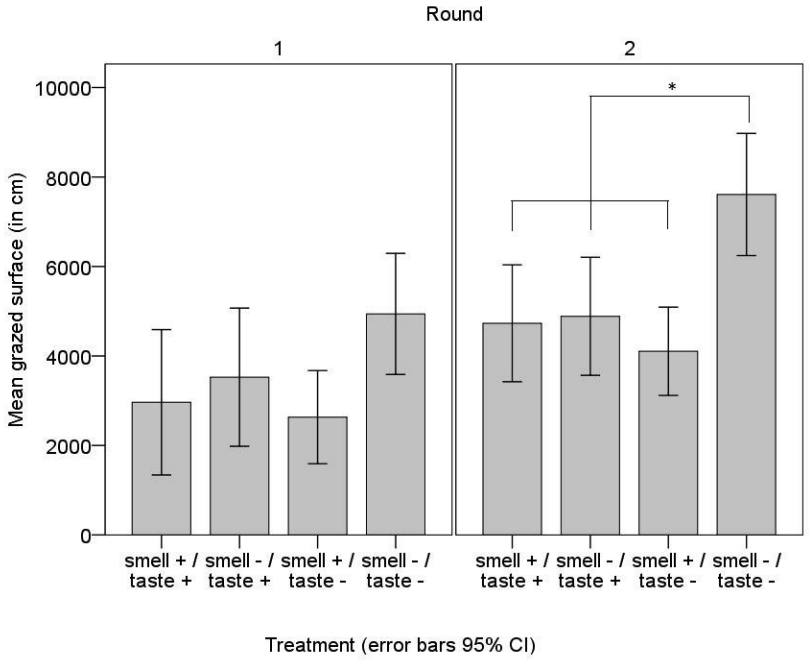

Figure 2. Mean grazed surface around dung pat.

Discussion and conclusions

The results of this study show that smell is the main factor for cows to reject tall grass around dung pats, while smell and/or taste reduces the grazed surface around dung pats. These findings are in line with findings of Marsh and Campling (1970) and MacDiarmad and Watkin (1972). The differences in uptake of tall grass could not be explained by the feeding value and mineral content of these grasses, as these were not significantly different between the treatments (results not shown). This might explain why tall grass around dung pats were not completely neglected, which is in line with findings of Bosker *et al.* (2002). Results on the effect of smell and/or taste could have been more pronounced if dung pats without smell and taste were left out, in order to stimulate the cows to make a choice between smell or taste. In conclusion it is recommended to direct pasture management at those measures which optimise rapid disappearance of the dung pat and its smell, e.g. by means of harrowing with watering (unpublished results).

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