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BRIEF COMMUNICATION: Liveweight gain of grazing dairy calves in their first season subjected to a targeted selective anthelmintic treatment (TST) regime

R.W. McANULTY*, S.J. GIBBS and A.W. GREER

Faculty of Agriculture and Life Sciences, P.O. Box 84, Lincoln University, Lincoln 7647, New Zealand
*Corresponding author: robin.mcanulty@lincoln.ac.nz

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INTRODUCTION

For some time now it has been recognised that suppressive anthelmintic regimes select strongly for resistance (Jackson & Miller, 2006). However, despite widespread anthelmintic resistance on beef properties in New Zealand (Waghorn *et al.*, 2006), little attention has been paid to the sustainability of anthelmintic practices in dairy systems with many dairy calves frequently exposed to suppressive or neo-suppressive anthelmintic regimes in order to ensure animals reach live weight targets. Here we investigate a performance-based targeted selective treatment anthelmintic regime in grazing dairy calves during their first year of grazing in order to reduce anthelmintic usage while safeguarding productivity.

MATERIALS AND METHODS

Animals and treatments

The study was carried out on two commercial dairy herds in Canterbury, each containing a mixture of Friesian and Friesian x Jersey female calves. For Herd A, 107 four-month-old calves (mean live weight 105 ± 2 kg) were allocated to one of two treatment regimes (n =54 and n = 53) that were balanced for live weight, breed and date of birth for a period of 284 days . One regime (NST) consisted of neo-suppressive anthelmintic treatment of all animals at monthly intervals until eight months-of-age and then every six to eight weeks until 13-months-of-age. The second group (TST) received targeted selective treatment in which anthelmintic was only administered to individuals if they failed to meet pre-determined growth rates as described below. All TST animals were, however, strategically treated with anthelmintic in late March to remove any residual parasite burden prior to winter grazing. Both NST and TST animals were rotationally grazed together on irrigated ryegrass pastures ahead of 530 lactating dairy cattle to ensure equal feeding allowances and parasite larval challenge. When the calves were nine months-of-age the cows were removed. For Herd B, 100 3-month-old calves (mean live weight 92 ± 1 kg) were allocated to two groups (n = 50) that had the same treatments imposed and grazing management as described for Herd A with the exceptions that animals were transported in December at four months of age, to a contract graziers property carrying approximately 400 calves and 450 rising two-year-old cows, and wintering 700 adult dry cows for two months, all animals were strategically treated in early May. The trial continued for 310 days. The anthelmintic used for all treatment groups in both herds until the calves were eight-months of age was Ravensdown Combination Mineralised Cattle Drench (10 mg albendazole and 7.5 mg levamisole per kg live weight); thereafter animals were treated with Cydectin Pour-on, Fort Dodge NZ Ltd (0.5 mg moxidectin per kg live weight). However, due to the failure of the moxidectin pour-on administered to Herd B in May to reduce the concentration of nematode eggs in the faeces by >95%, all animals from Herd B were subsequently re-treated with both the albendazole and levamisole oral combination and moxidectin pour-on. This combination of all three anthelmintics was then used for the remainder of the study in this herd only.

Measurements and sampling

Animals were assessed every four weeks until eight months-of-age and then every six to eight weeks thereafter until a mean herd age of 13 months. At each assessment, animal live weight was recorded and faecal samples taken directly from the rectum of each animal for the determination of the concentration of nematode eggs in the faeces (FEC; eggs per g of faeces (epg)) following flotation in saturated salt. The target growth rates which triggered anthelmintic treatment of TST individuals were calculated to provide for a live weight at 13 months (September) of 250 kg and 262 kg for Friesian x Jersey and Friesian calves, respectively. The target varied between 580-680 g/d until May and then decreased to 600 g/d and 630 g/d during May and was 326 g/d and 347 g/d from June to August for Friesian x Jersey and Friesian calves, respectively. Any TST animal that did not meet its target liveweight gain was treated with anthelmintic. All animals were returned to grazing directly after sampling.

Statistical analysis

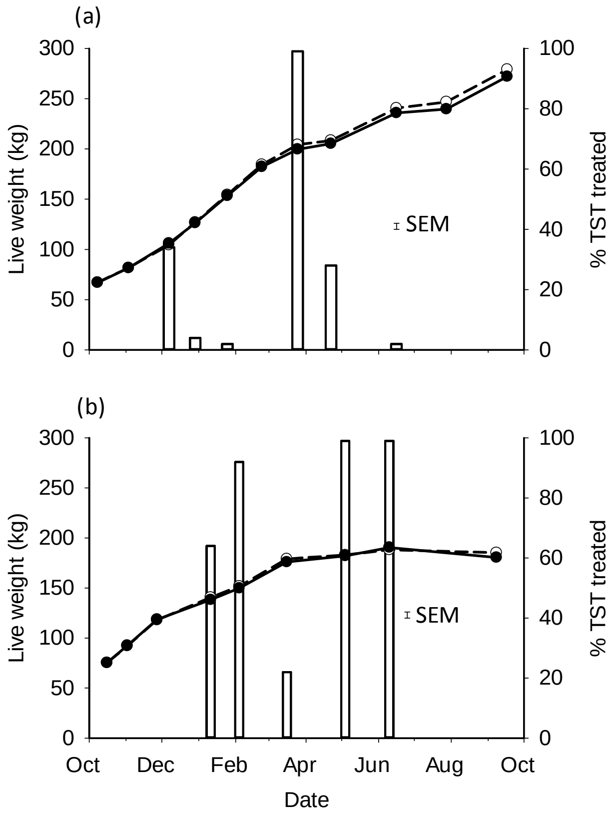
All data were analysed using GenStat (Payne *et al.*, 2009). Live weight underwent sequential comparison of anti-dependence structures before being analysed as repeated measures using restricted maximum likelihood (REML). Individual calf live weight was regressed against time, with the regression coefficients analysed as repeated measures using a mixed model REML with herd as a random effect and treatment (TST or NST) as a fixed effect. Missing data were included in the statistical analysis with estimates of missing values.

RESULTS AND DISCUSSION

The primary objective of the current study was to evaluate the suitability of a targeted selective treatment (TST) anthelmintic regime based on liveweight gain to reduce the anthelmintic usage in grazing dairy calves while safeguarding animal performance. To this end, TST regimes reduced total anthelmintic use compared with the NST regimes by 72% and 47% in Herds A and B, respectively (Figure 1). However, this reduction in anthelmintic use did result in a slight compromise in animal performance. Although live weight between NST and TST in either herd did not differ (P >0.05), liveweight gain did show a herd x treatment interaction (P = 0.03) which reflected reductions of 5% and 2% for Herds A and B, respectively. While there are no reports in the literature of the impact of TST regimes on the performance of grazing dairy calves, these results are in agreement with those reported in sheep using a similar TST regime which reduced anthelmintic use by 50% compared with a monthly treatment regime with a negligible effect on lamb growth (Greer *et al.*, 2009). The lesser requirement for anthelmintic in Herd A may well reflect a lesser larval challenge than that experienced by Herd B. Evidence for this can be observed from the mean FEC for all animals in Herd A on all occasions of 43 epg compared with 97 epg in Herd B and presumably reflects the greater proportion of adult animals on the areas grazed by Herd A. These adult cattle may have acted as net removers of parasite larvae. Thus, although care must be taken in extrapolating the current results to different herds in different environments, a performance-based TST regime in situations where young stock are grazing in rotation with adult stock may be a suitable alternative to suppressive anthelmintic treatment regimes as there would be minimal risk of exposure to large challenges that would lead to clinical parasitism.

The current target liveweight gains were calculated to provide for a target live weight commonly used in commercial dairy herds in New Zealand. The result was target liveweight gains that varied depending on the season and which were considerably lower than the 750 g/d suggested for Swedish first season grazing calves following retrospective analysis by Höglund *et al.* (2009).

FIGURE 1: Mean live weight (kg) (line) and percentage of TST animals that received anthelmintic treatments (bar) at each sampling time for animals from Herd A (a) and Herd B (b) that either received a neo-suppressive anthelmintic regime (NST, ○, dashed line) or were treated with anthelmintic on an individual basis as part of a targeted selective treatment regime according to their ability to reach target liveweight gains (TST, ●, solid line). For Herd A, all NST animals were treated with anthelmintic on 29 December, 25 January, 23 February, 25 March and 16 June. For Herd B, all NST animals received treatments on 2 November, 27 November, 11 January, 4 February, 16 March, 4 May, and 10 June. SEM = pooled standard error of the mean.



Nevertheless, the current TST regime appeared to have had a limited impact on the number of animals that reached their September live weight target, with 17% and 28% of Herd A for NST and TST, respectively, and all animals from Herd B failing to reach their live weight target. While the reasons for the disparity in overall growth between Herds A and B were beyond the scope of this investigation, it seems probable that it was due to environmental factors other than parasitism. Despite the failure of the anthelmintic in May to control the parasite infection in Herd B, an effective anthelmintic was used at the remainder of the treatment times, yet even the suppressively treated animals grew at only 60% of the rate of their counterparts in Herd A. With this in mind, setting suitable liveweight gain targets to optimise anthelmintic usage provides a challenge to the TST approach, particularly during periods of restricted feeding.

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