

Alkanes and controlled release devices for estimating intake of ryegrass by cattle*¹RW Dicker, ²RM Herd, ²VH Oddy*¹NSW Agriculture, Agricultural Research and Advisory Station, Glen Innes, NSW 2370²NSW Agriculture, CRC for the Cattle and Beef Industry, NSW 2351

Long chain alkanes (mainly odd-chain) occur naturally in plants and are quantitatively recoverable in faeces of ruminants. A known dose of synthetic even-chain alkanes, together with alkane concentrations in forage and faeces, have been used to estimate forage intake (1). The present experiment evaluated the use of alkanes administered by an intra-ruminal controlled release device (CRD) for estimating the intake of a highly digestible forage by beef cattle.

Six Hereford x Angus steers (mean 387 kg) were individually fed freshly cut Italian ryegrass (*Lolium multiflorum* cv Concord; 33 % DM; estimated DM digestibility (DMD) 74% and 2.2% N in DM). Three were offered and ate 14 kg, and three 18 kg, of fresh matter daily. After 2 weeks, steers were each given a CRD (day 0) delivering 354 ± 27 (sd) mg/day of C32 and C36 alkanes for 15 days. Samples of forage were taken every two or three days and of faeces on day 0, 2 and then daily for 20 days. The alkane compositions of forage and faeces samples dried at 60°C were analysed by gas chromatography. Intake estimates were calculated using published formulae (1).

The alkane composition of six forage samples was C31 = 257 ± 64 , C32 = 8 ± 1 , C33 = 78 ± 19 and C36 = 0 mg/kg DM. Faecal concentrations of the dosed even chain alkanes in faeces stabilised from days 3 to 5 and began to decline from days 14 to 19. C32 and C36 concentrations averaged over days 5 to 13 were used for calculating intakes. The period between elevation and decline in concentration of dosed alkane in faeces indicated a CRD payout of 14.7 ± 1.6 days, which agreed with the suppliers calibration.

Estimates of daily intake of DM calculated assuming similar faecal recovery of alkane pairs C31:C32 and C33:C32 were $82 \pm 9\%$ and $80 \pm 7\%$ of actual intake. However, actual recoveries were calculated (2) to be: C31 = 80 ± 4 , C32 = 96 ± 9 , C33 = 84 ± 4 and C36 = $96 \pm 7\%$. After adjustment of faecal alkane concentrations for these recoveries, intake estimated using C32:C33 was 101 (± 11)% of actual. Intake estimated from the dose of C36 and using a recovery of C36 = 95% (1) was $101 \pm 8\%$ of actual.

Our results show that alkanes administered by CRDs can be used to estimate intake of a highly digestible forage. Intake may be underestimated however if faecal concentrations of alkanes are not adjusted for apparent differences in recoveries between alkane pairs. These differences in recoveries were greater than those previously reported (1).

We thank K Ellis for supply and calibration of CRDs, A. Hendry and R. Hegarty for alkane analyses and P. Kamphorst, J. Nelson and K. Dunbar for field operations.

1. Dove H, Mayes RW. The use of plant wax alkanes as marker substances in studies of the nutrition of herbivores: a review. Aust J Agric Res 1991;42:913-52.
2. Herd RM, Williams TMJ, Woodgate R, Ellis KJ, Oddy VH. Using alkane technology to measure intake of a barley diet by cattle. Proc Nutr Soc Aust; 1996;20:(see index this publication)