PREDICTION OF FAECAL OUTPUT IN STEERS USING CHROMIC OXIDE CONTROLLED RELEASE DEVICES

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Estimating intake is a major limitation to interpreting performance data from grazing animals. Chromium sesquioxide (Cr_2O_3) is an inert marker which has been used to predict faecal output for individual sheep and cattle. In combination with an estimate of the digestibility of the grazed forage an estimate of individual animal intake can be calculated. The study reported here compared actual faecal output from steers measured by total daily collection in an animal house with predicted faecal output using Captec Chromeâ controlled release devices (CRDs).

Nineteen steers (group 1) were offered one of three precision chop silage diets (a hybrid sweet sorghum cv Supersweet (seven steers/treatment) and two hybrid maizes cv SR73 and XL82 (six steers/treatment)) *ad lib.*, and six steers (group 2) were fed oaten and then lucerne chaff in a changeover experiment in which dry matter intake was restricted to 18 g/kg liveweight. After a minimum 21 day period of adjustment to the diets all the steers were housed in pens designed to allow the collection of faeces. Ten days prior to first faeces collection steers were dosed with CRDs from the same batch (No. 80516-2). CRDs contained 65% Cr_2O_3 (w/w) and had a specified release rate of 1536 mg Cr_2O_3/day. At the time of dosing faecal 'grab' samples were collected from each animal *per rectum*, and bulked within diets to determine background dietary chromium levels. Total faecal output was collected daily at 1100 hours for seven consecutive days and subsampled (daily sample). An additional sample (10% of total daily output) was collected and bulked over the seven days and used to determine faecal dry matter content and *in vivo* digestibility. Grab samples were collected at 1100 hours on days 1, 4 and 7, at the completion of the 24 hour collection period. Samples were dried in a forced draught oven at 80°C for 48 hours and ground (1 mm screen) prior to chromium analyses at the CSIRO Laboratories, Chiswick, NSW. Cr_3O_2 release rates for individual capsules were calculated from measured faecal output for days 1, 4, and 7, and from the corresponding faecal Cr_3O_2 concentrations. Linear mixed models including terms to account for steer, day, diet and time effects and the appropriate interactions were used to predict mean Cr_3O_2 release rates, and REML (Patterson and Thompson 1971) was used for variance component estimation. Due to the nature of the data groups 1 and 2 were analysed separately. Following these analyses t tests were conducted to test for significant differences between the predicted and specified release rates.

Results are only presented for 18 steers on the silage diets due to the failure of one capsule (XL82 treatment) to release chromium. It is not considered possible for the capsule to have been regurgitated and gone unnoticed. Mean intakes were 4765, 5114, 5396, 2416 and 2382 g OM/day and mean faecal outputs were 1671, 1413, 1397, 1050 and 880 g OM/day on days 1, 4 and 7 for the Supersweet, SR73, XL82, oaten chaff and lucerne chaff diets respectively. Mean predicted release rate from grab samples in group 1 (1411 mg Cr_2O_3/day) was significantly lower ($P<0.05$) than the specified rate and led to an overestimate of faecal output by 14.5% (1728 vs 1509 g OM/day). There were no significant differences between predicted and specified rates for daily samples. Mean predicted release rate differed significantly between diets in group 2 for both the daily ($P<0.05$) and grab ($P<0.01$) samples. Mean predicted release rate from grab samples for the lucerne chaff (1212 mg Cr_2O_3/day) was significantly ($P<0.01$) lower than the specified rate and led to an overestimate of faecal output by 28% (1125 vs 880 g OM/day).

This study showed that, as with sheep (Parker *et al.* 1989), diet type can affect the release rate from the CRDs. The significant difference between predicted Cr_2O_3 release rate observed with grab samples but not daily samples indicates a systematic bias in faecal Cr_2O_3 concentration probably due to time of sampling.

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