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# The Measurement of Faeces Output (Summary)

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This paper dealt with the use of chromium sesquioxide as a reference substance in the estimation of the faeces voided by the dairy cow. Knowing the weight of chromium oxide fed and its concentration in the faeces, the weight of faeces voided can be calculated. The volumetric method of chromium estimation used is based on that of Kolthoff and Sandell (1).

Animal experiments described were conducted with the following objects:—

- (1) To test the recovery of chromium oxide from the animal.
- (2) To develop a satisfactory marker feeding and faeces sampling technique giving the least interference with the milking cow.
- (3) To check the faeces output calculated from chromium against the measured faeces output.

A fourth point which arose during this work—the effect on marker concentration of combining faeces samples—was also examined.

The cows were dosed twice daily and the marker used was commercial chromium sesquioxide as used for chrome green paint pigment. After capsule feeding, a faeces sample of approximately half to 1 lb. weight was taken manually from the rectum. This is designated the "Grab" sample and is the sample of most importance in the practical application of the method. Where quantitative faeces collection was made two other types of sample were also taken (a) The "Representative" sample consisting of 200-300 gram of the well-mixed daily total faeces collected in bags; (b) The "Combined Representative" sample where the individual daily representative samples were combined on an aliquot weight basis for the period of the trial to give one sample for analysis.

Five technique experiments with cows, where quantitative collection of faeces was made, were described.

## RESULTS

The "Combined Representative" samples from all five experiments were used to test the recovery of chromium oxide from the animal. All recoveries were for 10-day periods except in Expt. 5 where a 14-day period was taken.

### PERCENTAGE RECOVERIES OF CHROMIC OXIDE

#### Stall Feeding (Cut Pasture)

Expt. 1.—6 cows for 10 days	98.6
Expt. 2.—3 cows for 10 days	87.4
Expt. 3.—3 cows for first 10 days	88.8
3 cows for second 10 days	97.4
Total recovery	92.3
Expt. 5.—2 cows for 14 days	101.2

### Field Grazing (Pasture)

Expt. 4.—3 cows, first 10 days	101.6
3 cows, second 10 days	103.5
3 cows, third 10 days	100.0
3 cows, fourth 10 days	96.7
Total recovery (40 days)	100.5

With the exception of results from Expt. 2 and the first 10 days and total recovery of Expt. 3 these chromium recoveries are satisfactory.

The important sample from the practical aspect, the "Grab" sample was found to represent adequately the daily and half daily representative faeces samples. Both morning and evening "Grab" samples would appear necessary, however, as a mean difference of 15% between morning and evening marker concentrations was observed in the Field Grazing experiment. Using individual half daily "Grab" samples, faeces recoveries for 10-day periods were calculated from the chromium oxide concentrations and expressed as percentages of the weight of faeces actually collected during the corresponding 10-day period. As with chromium recoveries these were very satisfactory except in the case of Experiments 2 and 3.

To give an overall picture of the results of these experiments the faeces calculated from the chromium concentration of "Grab" samples were plotted against faeces weighed in bags for all cows, for 10-day periods. From this it appeared that the percentage recovery of faeces was to some extent dependent on the level of faeces output, a situation which would explain the low results obtained with some of the stalled animals on a low intake as against the grazing animals. The standard error for a single observation—one cow for 10 days using "Grab" samples—was of the order of plus-minus 5%.

As bulking of grab samples was necessary for the field application of this method of measuring faeces output this aspect was studied. The correct form of bulking would be on an aliquot-weight basis but as this is clearly impossible, a procedure involving bulking on an equal-weight basis, over a 14-day period, was adopted. Equal-weight bulking was shown mathematically to lead always to an over-estimation of marker or conversely to an under-estimation of calculated faeces. Under field conditions this under-estimation of faeces output was demonstrated to be of the order of 3.5%.

- (1) Kolthoff, I. M., and Sandell, E. B., *J. Ind. Eng. Chem. Anal. Ed.* Vol 2, No. 2, 140-145 (1930).