

Using Alkanes to Predict Voluntary Intake, Faecal Output and Digestibility of Buffel Grass Hay Fed to Steers.

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The cuticular waxes of forage plants contain long chain n-alkanes with odd carbon chain lengths in the range C₂₅-C₃₇ which are quantitatively recovered in faeces. When these concentrations are used with the concentrations of administered synthetic even chain length alkanes, the voluntary intake (VI), faecal output (FO) and digestibility (DMD) of forages can be estimated (Dove and Mayes 1991, 1996).

The present experiment evaluated the use of synthetic alkanes administered by a controlled release device (CRD) delivering 200mg of C₃₂ and C₃₆ daily to *Bos indicus* cross steers (average weight 215 ± 4kg) fed one of two low quality buffel grass (*Cenchrus ciliaris* cv. *Biloela*) hays individually in pens. All animals were accustomed to their pens, fed *ad libitum* (10% refusal) for a period of two weeks and dosed with a CRD which was allowed to stabilise for seven days before faecal samples were collected. The alkane composition of feed and faeces, dried at 60°C, was determined using gas chromatography. Voluntary intake, FO and DMD estimates were calculated using published formulae and regressed against measured values.

Average alkane composition (mg/kg DM) of feeds were C₃₁ 643 ± 35, C₃₂ 38.5 ± 0.1, C₃₃ 510 ± 62, C₃₅ 79 ± 12 and C₃₆ 9 ± 0.1. Faecal concentrations of dosed alkanes stabilised after five days but only concentrations measured between days 7 and 17 were used to estimate *in vivo* parameters. The relationships between estimated

and measured parameters are summarised in Table 1.

The best prediction of VI was the one based on C₃₁:C₃₂ with R² of 76% and an equation not different from the 1:1 line. This prediction also produced the highest Spearman's rank correlation coefficient. Faecal output estimates based on predictions made with C₃₂ or C₃₆, either assuming a 95% recovery or using a value calculated from feed and faeces but assuming complete recovery of the artificial alkane, accounted for 80-82% of the variation in FO but did not represent the 1:1 line having slopes between 0.51 and 0.73. Spearman's rank correlation coefficients were also variable. Results demonstrate the usefulness of alkanes for estimating VI and FO but buffel grass has more natural C32 than C36 suggesting more reliable predictions of FO should result from estimates based on C36. Also unknown is whether the recovery of administered C32 and C36 is the same as the natural occurring component.

Dove, H. and R. W. Mayes. 1991. The use of plant wax alkanes as marker substances in studies of the nutrition of herbivores: A Review. *Aust. J. Agric. Res.* 42: 913.

Dove, H. and R. W. Mayes. 1996. Plant wax components: A new approach to estimating intake and diet composition in herbivores. *J. Nutr.* 126: 13.

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Table 1. Summary statistics for regressions of estimated VI, FO and DMD on *in vivo* VI (g/kg LW); FO (g/kg LW) and DMD (%) for steers fed low quality buffel grass hays.

	VI			FO				DMD
	31:32	32:33	35:36	C ₃₂ (Cal)	C ₃₂ (95)	C ₃₆ (Cal)	C ₃₆ (95)	
R ² (%)	76	74	70	80	82	82	82	48
Intercept	-1.60 ±2.2	-1.5 ±2.4	4.06 ±1.7	0.9 ±0.5	0.7 1.31	1.6 ±0.6	1.7 ±0.7	10.3 ±8.4
Slope	1.12 ±0.14	1.13 ±0.15	0.73 ±0.11	0.51 ±0.06	0.57 ±0.07	0.68 ±0.07	0.73 ±0.08	0.78 ±0.18
Rank Cor.	76	71	75	78	66	74	73	66