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Using cuticular wax alkanes to estimate herbage intake in animals fed supplements

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The odd-chain hydrocarbons (alkanes) of plant cuticular wax, in combination with orally-dosed, even-chain alkanes of adjacent chain length, can be used to estimate herbage intake in ruminants (Mayes *et al*, 1986, J Agric Sci, Camb, 107, 161-170), provided the faecal recoveries of the two alkanes are similar. The method also can be applied to animals receiving supplements, provided the alkane content of the supplement and its intake by individual animals are known. However, there are no published data in which alkane-based estimates of herbage intake have been combined with independent estimates of supplement intake.

Individually-penned male castrate sheep (n = 18) were offered diets of lucerne chaff : oat grain in the ratios 593 : 107, 488 : 214 and 378 : 322 g DM/d (6 sheep/diet). Intakes of the oat grain ('supplement') were estimated over a 6-day period by labelling the grain with tritiated water (Juwarini *et al*, 1981, Aust J Exp Agric Anim Husb, 21, 395-399) and monitoring the accumulation of tritium in the body water pool, arising from the consumption of the labelled grain. The tritium content of the labelled oat grain and of body water (from jugular blood samples) was determined by liquid scintillation counting.

Over the same period, intakes of the chaff were estimated using the alkane method, by dosing the animals twice daily with capsules containing 40 mg of each of C28 and C32 alkanes and taking rectal faeces samples. Alkanes were extracted from capsules and from freeze-dried herbage, grain and faeces samples and quantified by gas-liquid chromatography (Dove, 1992, Aust J Agric Res, 43, 1711-1724). Intakes of lucerne chaff were then calculated from the concentrations of adjacent odd-chain (natural) and even-chain (dosed, plus small quantities of natural) alkanes in the faeces and the diet components. Three estimates of lucerne intake were thus possible, based on the alkane pairs C28/C29, C31/C32 and C32/C33.

Supplement (oat grain) intakes estimated using tritium as a marker did not differ significantly from known supplement intakes. Intakes of lucerne chaff estimated using C28/C29 alkanes were significantly greater than the other estimates ($P<0.001$) and over-estimated known intakes by more than 21 %, partly because of a difference of 5 % in the faecal recovery of these two alkanes. Intakes based on the C31/C32 pair over-estimated known intakes by 6 % ($P<0.05$), but there was no significant difference between known intakes and those based on the C32/C33 alkane pair, despite the relatively low content of C33 in lucerne. The results confirm earlier data based on known supplement intakes (Mayes *et al*, 1986), in demonstrating that dosed C32 and natural C33 alkanes can be used to obtain accurate estimates of herbage intake in animals which are also consuming grain supplements.

	Grain intake (g DM/d)	Lucerne intake (g DM/d)		
		C28/C29	C31/C32	C32/C33
Known	215	488	488	488
Estimated	227	594	520	497
Difference	NS	P<0.001	P<0.05	NS