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A PRELIMINARY REPORT ON THE USE OF n-ALKANES AS A METHOD OF ESTIMATING DIGESTIBILITY AND DRY MATTER INTAKE OF GOATS

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ABSTRACT

The objective was to establish whether reliable intake and digestibility estimates could be obtained under range conditions using n-alkanes. Goats both browse and graze, which makes the use of n-alkanes to estimate intake problematic since the technique was developed for use on pure pastures. Under range conditions a multi-species situation exists, with different alkane profiles within and between the bush and grass components. Five goats from two stocking rates (8 and 24 goats/ha) were used to estimate intake and digestibility during March 1994 using alkanes as indigestible internal markers, and C₃₂ as an external marker. N-alkanes yielded acceptable estimates of intake and digestibility. The technique needs further verification, but shows promise.

INTRODUCTION

Obtaining accurate dry matter intake estimates is important in grazing animal research. There are weaknesses in all the available techniques of estimating the intake of grazing animals. Intake can be estimated using faecal excretion and indigestibility of selected feed. The material selected (oesophageal samples) can be collected using either the old bag technique or the new remote-controlled oesophageal valve developed at Fort Hare. Alkanes can be used as markers to establish both the intake of grazing animals and the digestibility of the material they select (Dove and Mayes 1991).

The objective was to establish whether accurate and acceptable dry matter intake and digestibility estimates could be obtained under range conditions using the n-Alkane technique. Since the technique has been developed for use on pure pastures, or a mixture of two pastures at most, the use of n-alkanes to estimate dry matter intake is more problematic for goats, which are mixed feeders. Under range conditions a multi-species situation exists, and there is a mixture of both bush and grass, with different alkane profiles within and between the two components (Table 1).

MATERIALS AND METHODS

Five goats from each of two stocking rates (8 and 24 goats/ha) were used to estimate intake and digestibility of selected material during March 1994. Dry matter intake and digestibility were calculated using natural alkanes as indigestible markers and dosed C₃₂ as an external marker.

RESULTS

Table 1. The alkane content (mg/kg) of major bush and grass species on Fort Hare Farm.

Species	C ₂₉	C ₃₁	C ₃₃	C ₃₅
Bushes				
<i>Rhus lucida</i>	106.0	1860.2	706.1	16.6
<i>Ehretia rigida</i>	56.6	74.2	6.0	0
<i>Acacia karroo</i>	35.0	1.7	13.2	0
Grasses				
<i>Digitaria eriantha</i>	101.6	664.0	507.9	82.6
<i>Themeda triandra</i>	76.5	474.9	369.9	66.7
<i>Cymbopogon plurinodis</i>	105.8	50.2	314.8	49.7

It is clear that variation between bush and grass, and within the two components, is considerable (Table 1). Variation within a season was also reported in the alkane profile of *Pennisetum clandestinum*. These factors could affect the accuracy of results if not taken into consideration in the planning and execution of research using the alkane technique.

Intake estimates using n-alkanes were in the range expected. Intake was significantly higher ($P < 0.05$) in the high stocking rate treatment, contrary to expectations (Table 2). Intake also became lower towards the end of the experimental period due to available feed becoming limiting. Both these trends were reflected in milk yields (reported elsewhere).

Table 2. Estimated dry matter intake of goats at two stocking rates.

Period	Stocking rate	DM intake (kg/d)	DM intake (g/kg $W^{0.75}$)
I	Low	1.29	77.9
	High	1.38	73.8
II	Low	1.09	64.4
	High	1.50	80.6
III	Low	1.03	61.7
	High	1.42	64.9

The digestibility of the material selected appeared to have been estimated more accurately when using C_{33} instead of C_{35} (Table 3). The estimates were in the range of expected digestibility.

Table 3. A comparison of digestibility estimates (%) of goats at two stocking rates using two alkanes.

Period	Stocking rate	C_{33}	C_{35}
I	Low	66.4	79.0
	High	65.0	34.9
II	Low	66.9	13.2
	High	69.5	46.6
III	Low	65.8	33.7
	High	67.1	59.8

CONCLUSIONS

1. n-Alkanes appeared to yield acceptable estimates of intake. A comparison of this technique with the standard *in vitro* technique is currently under way.
2. Digestibility appeared to be estimated accurately using n-alkanes. The C-chain length appears to be important since low levels of C_{35} did not yield acceptable values.
3. The technique needs further verification under multi-species conditions, but shows promise for estimating intake and digestibility in grazing animals.

REFERENCE

Dove, H. and Mayes, R.W. (1991). The use of plant wax alkanes as marker substances in the study of herbivore nutrition: a review. *Aust. J. Agric. Res.* 42 (6): 913.