

A comparative study between the determination of dry matter digestibility *in vitro* and *in vivo*

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Introduction

The digestibility value of a feed is one of the best indicators of nutritive value. *In vivo* determinations are expensive and time consuming rendering this technique impractical for routine analyses. *In vitro* determinations of digestibility using rumen fluid/cellulase have been used extensively in laboratories worldwide. The use of the Daisy II apparatus for the *in vitro* digestibility determination, using the Minson & McLeod buffer and the 48 h pepsin digestion, was found to be easy and reliable. However, the difference in results between continuous shaking and twice daily shaking prompted a comparative study between *in vivo* and *in vitro* digestibility of kikuyu grass, ryegrass and eragrotis hay.

Material and Methods

Metabolic cages were used to house six sheep fed on kikuyu grass, ryegrass and eragrotis hay. The weight of the food given and left and of the faeces, was recorded daily for each sheep. The *in vivo* trials were conducted during a 10-day period using 10 Dohne wethers after a week of adaptation. A daily sample of the pasture given to each animal was analysed *in vitro* using the Daisy II apparatus and the procedure described by Minson & McLeod with a 24 h pepsin digestion, with continuous and twice-daily shaking. The values of the samples analysed *in vitro* were compared with the values *in vivo*.

Results and Discussion

Results presented in Table 1, show that both eragrotis hay and ryegrass had a lower digestibility *in vivo* than *in vitro* with continuous shaking, but was higher when compared with *in vitro* with twice-daily shaking. Kikuyu grass, however, had a higher digestibility *in vivo* than *in vitro* with continuous shaking, rendering the comparison with *in vitro* with twice-daily shaking unnecessary.

Table 1 *In vivo* & *in vitro* dry matter digestibility of eragrotis hay, ryegrass & kikuyu grass

	<i>In vivo</i> Digestibility (%)	<i>In vitro</i> Digestibility (%)	
		Continuous shaking	Twice-daily shaking
Eragrotis hay	62.36 ± 1.795	66.35 ± 0.718	31.00 ± 1.417
Ryegrass	82.84 ± 2.491	94.65 ± 0.469	88.41 ± 1.073
Kikuyu grass	80.73 ± 4.57	72.97 ± 1.502	n.d.

The coefficient of variation (%) within days and within sheep for the different trials is presented in Table 2. The high coefficients of variation within days (between sheep) and between days (within sheep) for the *in vivo* values of the different feeds tested, explain the inability to develop a meaningful regression equation which would enable the prediction of *in vivo* results from the *in vitro* ones.

Table 2 Coefficient of variation (%) of *in vivo* and *in vitro* dry matter digestibility within days and within sheep for the different trials.

	<i>In vivo</i>		<i>In vitro</i> (continuous shaking)		<i>In vitro</i> (twice daily shaking)	
	within days	within sheep	within days	within sheep	within days	between sheep
E. hay	7.00 to 39.15	11.47 to 33.16	1.15 to 6.10	3.44 to 7.18	6.30 to 39.03	23.88 to 24.68
Ryegrass	1.81 to 18.06	7.51 to 13.50	0.31 to 1.48	1.22 to 1.60	1.01 to 2.21	2.72 to 3.39
Kikuyu grass	2.56 to 18.69	6.64 to 22.70	8.96 to 19.67	3.09 to 12.99	n.d.	n.d.

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Conclusion

The above study has shown that although the *in vitro* determination of dry matter digestibility values cannot be used as the absolute value of the feeds analysed, relative values when comparing different feeds are reproducible and are an accurate way of comparison.

References

Minson, D.J. & McLeod, M.N., 1972. Division of Tropical Pastures Technical Paper No. 8, Commonwealth Scientific and Industrial Research Organization, Australia