Investigation using zero time t_0 to compute protein rumen degradability (DT)

S Terramoccia[1], S Puppo[1], L Rizzi[2], U Francia[1], F Martillotti[1]

[1] Istituto Sperimentale per la Zootecnia, Via 0 Panvinio 11, 00162 Rome;
[2] Istituto di Zootecnia e Nutrizione Animale, Via S Giacomo 11, 40126 Bologna, Italy

The first attempts to estimate protein rumen degradability, by nylon bag incubation in the rumen, did not take zero time into account (Ørskov and McDonald, 1979); later computing systems, however, suggested knowledge of the t_0 (Nocek and English, 1986).

This study dealt with the following feeds (3 g, ground 1 mm): sunflower-extracted meal (SEM), flaked barley (FKB), field beans (FB), full fat soybeans (FFS), flaked maize (FM), flaked field beans (FKFB) and lupin beans (LB). The nylon bag (16 x 10 cm, Ø 41 μm) incubation was carried out in 3 fistulated cows for 1, 2, 6, 12, 18, 24, 48 and 72 h. t_0 was determined either experimentally (incubation in rumen fluid for 1 min) or by graphic interpolation. Three methods were used to estimate the parameters (a, b, c) of asymptotic curves and of protein rumen degradability (DT): 1) Nocek and English's procedure with experimental t_0; 2) Nocek and English's procedure with graphic t_0; 3) iterative best fitting computing procedure with experimental t_0. Determination coefficient values were satisfactory; the best were obtained with methods 1 and 3, even if RSD values are taken into consideration.

All 3 procedures can be considered effective for estimating DT but, when possible, the experimental t_0 should give better reliability.

Although some differences existed among, a, b, c parameters (higher in the flaked field beans and lupin beans than in the others), no great difference was noted in the protein degradability figures except for flaked maize which had a percentage difference of 7.92 (see table I).

Nocek JE, English JE (1986) J Dairy Sci 69, 77-87

Ørskov ER, McDonald I (1979) J Agric Sci Cambridge 92, 499-503

Table I.

Feed	a			R^2			RSD			DT %			Diff %		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
SEM	21.2	23.8	16.1	0.99	0.99	0.98	3.3	2.4	4.4	72.3	72.8	73.1	–	0.8	1.2
FKB	7.3	10.8	16.9	0.95	0.95	0.97	7.7	7.2	5.4	61.0	62.1	59.7	–	1.8	2.1
FB	35.0	37.0	28.1	0.99	0.99	0.99	3.7	2.8	3.5	79.3	79.8	79.4	–	0.6	0.1
FFS	24.2	24.4	13.4	0.96	0.96	0.99	7.5	7.6	4.4	69.2	69.3	69.6	–	0.1	0.6
FM	11.0	12.5	8.4	0.93	0.92	0.95	8.2	8.6	6.7	34.6	34.9	37.4	–	0.8	7.9
FKFB	32.1	41.1	16.4	0.93	0.88	0.92	8.1	11.2	9.0	76.4	78.1	78.1	–	2.3	2.3
LB	31.1	34.1	18.8	0.94	0.91	0.96	8.9	10.2	7.3	83.8	84.3	81.6	–	0.6	2.6