

KINETICS OF DEGRADABILITY OF NITROGEN IN COTTON-SEED MEAL AND BARLEY,
DIGESTED IN SACCO IN THE RUMEN OF SHEEP EATING NaOH-TREATED STRAW

K. AMANING-KWARTENG*, R.C. KELLAWAY* and JANE LEIBHOLZ*

The nylon bag technique has been used to estimate ruminal degradation of proteins. The relationship between % nitrogen (N) degradation (P) and time of incubation (t) is exponential and can be described by the equation: $P = a + b(1 - e^{-ct})$ (Ørskov and McDonald 1979). The constants a, b and c estimate the rapidly-soluble N fraction, the degradable N fraction and the rate constant for the degradation of b respectively and are particular to each protein and basal diet. The present experiment was designed to estimate these constants for cotton-seed meal and barley when incubated in nylon bags in the rumen of three sheep eating a diet of NaOH-treated straw (Amaning-Kwarteng et al. 1982) together with 150 g/d of whichever supplement was being tested. Nylon bags (8 x 17 cm, 25 µm pore size; 3/sheep/supplement) were incubated for 0, 3, 6, 9, 12, 24, 36 and 48 h. Other details of the in situ technique were according to Mehrez and Ørskov (1977). Degradation of N was estimated by the % disappearance of N in the supplement from the bags. The constants were calculated by an iterative least squares procedure.

Constants in equation $P = a + b(1 - e^{-ct})$, where P is % N degraded after time (t)

| | Coefficients | | | 100-(a+b) undegraded |
|------------------------------|--------------|------------|-----------------------------------|-------------------------|
| | a | b | c | |
| | Soluble | Degradable | Fractional degradation rate | |
| Cotton-seed meal | 12.5 | 71.4 | 0.112 | 16.1 |
| Barley | 2.8 | 94.6 | 0.085 | 2.6 |
| Probability | <0.05 | <0.05 | <0.05 | <0.05 |
| Coefficient of variation (%) | | | | |
| Within sheep | 1.97 | 0.13 | 11.28 | |
| Between sheep | 13.53 | 3.30 | 30.65 | |

The much larger variation between animals than within animals is similar to findings of Mehrez and Ørskov (1977). Significant differences in N degradability between soya-bean meal and cotton-seed meal were observed by Hughes-Jones (1979). The constants a, b and c were 9.5, 77.8 and 0.080 for soya-bean meal and 29.2, 36.5 and 0.063 for cotton-seed meal respectively. Differences in coefficients for cotton-seed meal observed by us and Hughes-Jones (1979) may be attributable to differences in extent of heating during processing as well as differences in the basal diet, since the coefficients are affected by the passage rate of the basal diet (Ganev et al. 1979).

AMANING-KWARTENG, K., KELLAWAY, R.C. and LEIBHOLZ, JANE (1982). Proc. Nutr. Soc. Aust. 7: 176.

GANEV, G., ØRSKOV, E.R. and SMART, R. (1979). J. agric. Sci., Camb. 93: 651.

HUGHES-JONES, M. (1979). M.Sc. Thesis, University of Aberdeen, cited by Ørskov, E.R., Deb Hovell, F.D. and Mould, F. (1980). Trop. Anim. Prod. 5: 195.

MEHREZ, A.Z. and ØRSKOV, E.R. (1977). J. agric. Sci., Camb. 88: 645.

ØRSKOV, E.R. and McDONALD, I. (1979). J. agric. Sci., Camb. 92: 499.

*Dept of Animal Husbandry, University of Sydney, Camden, New South Wales 2570