

Rumen degradability and intestinal digestibility of rumen undegraded protein from lucerne and pasture sward

T Zebrowska, P Dakowski, J Paja

*The Kielanowski Institute of Animal Physiology and Nutrition,
 Polish Academy of Sciences, 05-110 Jablonna, Poland*

The chemical composition and nutritive value of forages may vary considerably and depend on plant species and variety, rate of fertilization, rainfall, maturity and time of grazing or harvesting. These factors also influence the rate and extent of ruminal and intestinal digestion and, therefore, nutrition value.

The INRA-88 system of ruminant nutrition has been introduced into practice in Poland. The results, however, are not always satisfactory may be because there is not enough data on the nutritive value of Polish feedstuffs, expressed in INRA units.

The objective of the present work was to estimate the ruminal degradability of protein (deg) and fibre fractions, and intestinal digestibility of the lucerne and pasture sward protein undegraded in the rumen. Lucerne and pasture sward were grown under known conditions and harvested at different stages of vegetation. These results are compared with INRA data.

The samples of fresh lucerne and pasture sward were harvested, chopped and frozen. Three dry cows with rumen and duodenal cannulae fed meadow hay *ad lib* and 1.5 kg/d ground barley were used. Ruminal degradation

of protein and fibre fraction was estimated by the nylon bag method and intestinal digestibility of undegraded protein and amino acids during 16 h incubation in the rumen was measured both by the mobile bag technique and *in vitro* method.

About half of total lucerne protein was in the soluble fraction, as determined by washing after 0 h incubation. Degradability of lucerne protein harvested at the vegetative stage was 85 % and at flowering 75 %, calculated at outflow rate $k = 0.05$.

Pasture sward protein showed a slower degradation rate than lucerne: the soluble fraction accounted for 23 - 36 %, and protein degradability at $k = 0.05$ ranged from 51 - 67 %. The rate of protein, NDF and ADF degradation decreased with stage of maturity. Mean intestinal digestibility of rumen undegraded lucerne protein was 72 %, and that of pasture sward varied from 59 - 78 %. *In vitro* digestibility of most of the analyzed feeds was 5 to 9 % lower than measured by the mobile bag method.

The calculated PDI values differ considerably from the respective values published in Ruminant Nutrition Recommended Allowances and Feed Tables (1989, INRA).

| Feeds | CP (% in DM) | deg | PDIA | PDIN | PDIE |
|---------------------------|--------------|------|------|------|------|
| Lucerne | | | | | |
| vegetative | 25.2 | 0.85 | 31 | 152 | 85 |
| 10 % bud | 23.7 | 0.80 | 38 | 145 | 89 |
| 50 % bud | 21.5 | 0.80 | 35 | 131 | 83 |
| flowering | 21.2 | 0.75 | 43 | 131 | 89 |
| Pasture sward | | | | | |
| ear emergence, first cut | 12.3 | 0.64 | 37 | 80 | 91 |
| ear emergence, first cut | 17.4 | 0.51 | 59 | 104 | 114 |
| ear emergence, second cut | 17.7 | 0.67 | 52 | 116 | 107 |
| Meadow hay | 11.5 | 0.63 | 33 | 72 | 79 |