Changes in crude protein content with advancing maturity in lucerne

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Introduction The main determinants of the quality of lucerne forage are digestibility and protein content (Julier *et al*., 2001) as well as crude fibre content. In the early vegetative phases, the crude protein content of the leaves and stems is the highest and crude fibre content the lowest (Katic *et al.*, 2003). The aim of this study was to determine the rate of change in crude protein levels at different stages of growth and development.

Materials and methods Five lucerne genotypes in five phenological stages were studied in the second and third years (1997-1998) of the crop. Samples for analysis were taken at the five phenological phases according to Kalu & Fick (1981):

0. - Early vegetative: Stems ≤ 15 long; no buds, flowers or seed pods.
1. - Mid-vegetative: Stems 16 - 30 cm long; no buds, flowers or seed pods.
2. - Late vegetative: Stems > 30 cm long; no buds, flowers or seed pods.
3. - Early bud: one or two nodes with visible buds, no flowers or seed pods.
4. - Late bud: ≥ three nodes with buds, no flowers or seed pods.

The crude protein (Kjeldahl) content in the five genotypes was determined in the five phenological phases during the second growth cycle in 1998.

Results The crude protein contents of the leaves and stems decreased from the early vegetative phase until budding by 3.81 g/kg per day in the leaves and 5.55 g/kg per day) in the stems. The crude protein content of the leaves decreased the most in the mid-vegetative phase and at early budding. In the stem, the levels of crude protein decreased steadily from the mid-vegetative stage until full budding (Table 1).

Table 1 Daily decrease g/kg per day of crude protein during different phenological stages in lucerne

Decrease in CP content (g/kg per day)	to Mid -veg. (1)	to Late veg. (2)	to Early bud (3)	to Late bud (4)	Mean
Leaf	6.02	2.42	4.86	1.94	3.81
Stem	8.8	5.7	4.98	2.74	5.55

At full budding, the crude protein content of the leaves decreased by 1.94 g/kg per day), while that of the stem dropped by 2.74 g/kg per day). Anderson *et al.* (1973) reported a daily decrease of crude protein content of 2.0 g/kg per day) in spring growth.

Conclusions The daily decline of protein content in the leaves was most rapid in the mid-vegetative phase. Crude protein in the stem decreased steadily from the mid-vegetative phase until full budding.

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