

Intestinal digestibility of amino acids of lucerne in ruminants influenced by maturity stage

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Objective

The objective of this study was to evaluate the influence of stage of growth on the chemical composition, amino acid contents and intestinal digestibility of lucerne grown in the Czech Republic.

Estimated material

Lucerne (*Medicago sativa* L. var. Palava) from the same field was harvested at four successive dates, representing different stages within the 30 days of growth (Tab.1).

Each harvest day was represented by one lucerne sample.

Table 1. Growth stages of lucerne divided into four harvest days.

Day of harvest	Sample description
Day 0	end of May, height of 60 cm
Day 6	height of 65 cm
Day 20	early budding stage
Day 30	beginning of flowering stage

Methods

- Intestinal digestibility of amino acids:** the mobile bag technique (Frydrych, 1992; Homolka et al., 2007) using three dry Black Pied cows fitted with permanent large ruminal cannulas (120 mm internal diameter) and a T-piece cannula in the proximal duodenum.
- Determination of chemical compositions:** dry matter (DM), ash, crude protein (CP), ether extract (EE), crude fibre (CF), neutral detergent fibre (NDF), acid detergent fibre (ADF), and acid detergent lignin (ADL). Nitrogen-free extract (NFE) was calculated as the difference between DM and the sum of CP, EE, ash and CF.
- Determination of individual amino acids:** in the harvested samples, residues of rumen incubated (16 h) samples, and residues of samples after 24 h of intestinal digestibility.
- Statistical analysis:** using statistical programme SAS (2003).

Results

DM ($r=0.78$), OM ($r=0.95$), CF ($r=0.91$), NDF ($r=0.94$), ADF ($r=0.79$) and ADL ($r=0.48$) presented positive linear correlation coefficients (r) with growth stage, whereas CP ($r=-0.96$), EE ($r=-0.86$) and NFE ($r=-0.70$) showed negative relationships. The variability of DM, CP, NDF and ADF of lucerne as influenced by stage of growth is presented in Fig.1.

The influence of stage of growth on amino acid contents of harvested lucerne samples and intestinal digestibility after 16 h rumen pre-incubation is described in Tab.2.

Figure 1. Contents of dry matter (DM), crude protein (CP), neutral detergent fibre (NDF) and acid detergent fibre (ADF) of lucerne.

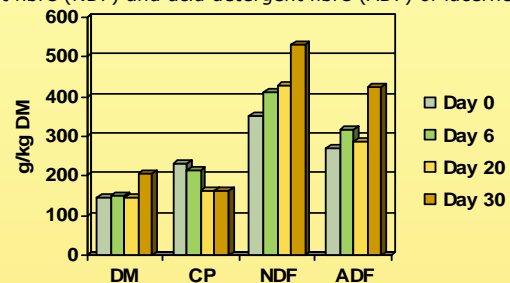


Table 2. The content of essential and non-essential amino acids, and intestinal digestibility of lucerne samples.

Day of harvest	TEAA	TNEAA	TAA	Nitrogen
Harvested lucerne composition (g/kg DM)				
Day 0	84.1	89.9	174.0	36.8
Day 6	77.8	90.1	167.9	34.0
Day 20	53.8	68.0	121.8	26.2
Day 30	55.3	52.8	108.1	26.1
r	-0.94	-0.94	-0.98*	-0.96*
Intestinal digestibility of lucerne				
Day 0	0.698	0.691	0.695	0.867
Day 6	0.822	0.844	0.833	0.846
Day 20	0.687	0.784	0.736	0.773
Day 30	0.513	0.538	0.525	0.699
r	-0.78	-0.58	-0.69	-0.99

TEAA = total essential amino acids; TNEAA = total non-essential amino acids; TAA = total amino acids; r = correlation coefficient; *P<0.05

Conclusion

This study, although hampered by a small sample size, illustrated that the amino acid contents and intestinal digestibility of lucerne (var. Palava) grown in the Czech Republic are influenced by growth stage, even over a period as short as 30 days. It has important practical implications in that the above parameters cannot be treated as a constant, but have to be established for each growth stage in further studies.