

AMINO ACIDS IN LUCERNE SILAGE: 1. EFFECTS OF CHOP LENGTH

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INTRODUCTION

- Lucerne (*Medicago sativa*) has a low sugar content and high buffering capacity making it difficult to ensile.
- Packing density during ensilage can alter protein degradation but little is known about the effects on individual amino acids
- We investigated the effect of chop length on the protein stability and amino acid profile of lucerne silage

MATERIALS AND METHODS

- Lucerne cut & wilted for 24 h was chopped to 25 (Long) or 12mm (Short length; SL)
- Ensiled in triplicate 2 L silos and inoculated with *L. plantarum* Ecosyl 100.
- Total N, Soluble N, lactate, VFA, pH and ethanol content was determined.
- Free and total amino acid (AA) determined by ion exchange chromatography.



RESULTS

- Forages did not differ in composition at ensiling.
- SL silage had lower pH & higher lactate (Table 1).
- No effect of chop length on silage total AA or total essential AA (EAA) concentrations but both total and essential free AA were lower in SL.
- SL silage had lower free AA (57.0 v 62.0; $P = 0.002$) and free EAAs (33.4 v 38.1; $P < 0.001$) when expressed as % of total AAs.
- Short chopping also reduced the free EAA as a % of the total EAAs (66.1 v 74.1; $P < 0.005$).

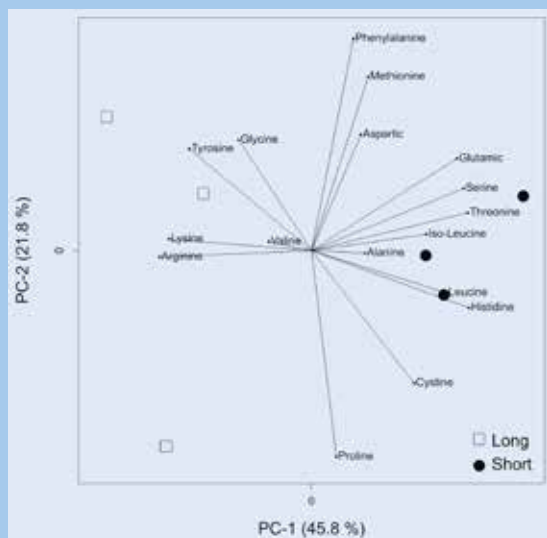


Fig 1. Total concentrations (g/kg DM) of AAs

Table 1. Chemical composition of lucerne following 96 days ensiling at two chop lengths (g/kg DM unless otherwise stated).

	Long	Short	s.e.m.	Prob
pH	4.47	4.40	0.009	0.007
Lactate	68.2	79.6	1.30	0.003
Acetate	15.4	18.4	0.487	0.013
Ethanol	5.26	2.85	0.183	<0.001
Lactate (% TFA)	76.9	77.6	0.38	0.266
Total N	32.6	32.1	0.36	0.413
Soluble N (g/kg TN)	840.5	807.5	9.55	0.071
Amino acids				
Total	166.4	165.4	1.20	0.581
Total essential	85.7	83.6	1.17	0.270
Total Free	103.2	94.2	0.23	<0.001
Free essential	63.4	55.2	0.21	<0.001

- Total concentrations (g/kg DM) of the EAA threonine and histidine, and non-essential serine and glutamic acid, were higher ($P < 0.05$), whilst EAA arginine and lysine were lower in SL silage ($P < 0.01$) (Fig. 1).
- In the free form, the % of EAA, arginine and lysine, and non-essential serine, were lower with SL ($P < 0.001$).
- In the free form, the % of EAA threonine, leucine and histidine, and non-essential alanine, proline, aspartic and glutamic acids, were higher with SL ($P < 0.05$).

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CONCLUSIONS

A shorter chop length silage, with a higher packing density, had lower free AA compared to long chop silage. When determined as a % of total AAs, a short chop silage had lower free AAs and free essential AAs compared to long chop.

