

Effect of differently conserved herbage on chemical composition of forages and nitrogen turnover in dairy cows

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Background

Feeding maximum forage to ruminants involves less competition with human food resources. Forages derived from herbage are often high in rumen-degradable crude protein (CP), resulting in poor nitrogen (N) utilisation by ruminal microbes and N losses to the environment. However, the mode of conservation can influence the CP fractions in forage and, thereby, the potential N utilisation by the animal. The objective of the present study was to determine the effect of three types of forage preservation on CP fractions and N efficiency in dairy cows.

Material and Methods

Ley, mainly composed of:
Lolium perenne, *Trifolium repens*
and *T. pratense*
34-d regrowth
Cut 30 August 2016



Forage conservation

- ➔ **Silage (SI)**
24 wilting
Baling at 56% DM
- ➔ **Ventilated hay (VH)**
27 h wilting
68% DM
Ventilation to 88% DM
- ➔ **Field-dried hay (FH)**
72 h drying on the field
86% DM

N balance trial

Replicated 3 × 3 Latin Square
6 multiparous Holstein cows (milk yield 23.5 ± 3.9 kg/d; 270.3 ± 7.2 d in milk)

- Adaptation period (14 d)
Collection period (7 d)
- Feed intake 0.95 of ad libitum intake in adaptation
 - Milk yield and composition
 - Total collection of urine and faeces
 - Ruminal fluid and blood collection on d 2 and 7 before the morning feeding



Analysis of non-protein N, buffer soluble N and fibre-bound N and calculation of CP fractions A, B1, B2, B3, C (assumed to decrease in ruminal solubility in this order)

Analysis of variance:
conservation method as main factor

Results

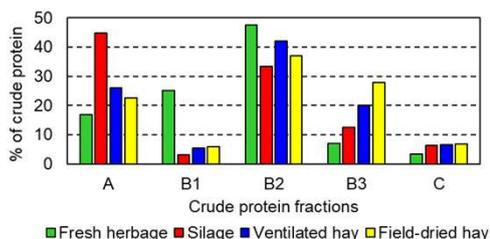


Fig. 1. Crude protein fractions in the fresh herbage and the conserved forage. CP, crude protein, A, B1, B2, B3, C, CP fractions according to Sniffen et al. (1992)

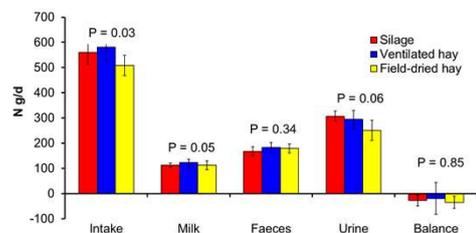


Figure 2. Daily N intake and N excretion via milk, faeces and urine and N balance.

Table 1. Daily intake of dry matter (DM) and relative excretion of N in urine and faeces as well as concentrations of ruminal ammonia and plasma and milk urea

	SI	VH	FH	P-value*
Feed intake (kg DM/d)	17.3 ^a	19.2 ^b	17.9 ^{ab}	0.05
Faecal N (% of total N intake)	30 ^a	31 ^a	35 ^b	<0.01
Urinary N (% of total N intake)	55	52	49	0.55
Ruminal ammonia (mmol/L)	7.4 ^{ab}	8.2 ^a	7.0 ^b	0.04
Plasma urea (mmol/L)	7.2 ^a	7.2 ^a	6.4 ^b	<0.01
Milk urea (mg/kg)	370 ^a	351 ^a	306 ^b	<0.01

* Effect of conservation method

Milk yield (19.7 kg/d) as well as fat (4.93%) and protein (3.79%) percentage did not differ between treatments.

Conclusions

Method of conservation affected crude protein composition of the forage. Feeding only forage derived from herbage in late lactation resulted in high urinary N losses and an N deficiency in dairy cows. The absolute excretion of urinary N was highest when cows were fed silage, which had more non-protein-N than the two other forages.