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► **To cite this version:**

M van Os, Jp Dulphy, René Baumont. The effect of protein degradation products in grass silages on intake and intake behaviour in sheep. *Annales de zootechnie*, 1994, 43 (3), pp.287-287. hal-00889026

HAL Id: hal-00889026

<https://hal.science/hal-00889026>

Submitted on 11 May 2020

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The effect of protein degradation products in grass silages on intake and intake behaviour in sheep

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Silage intake by ruminants is mainly limited by the extent of fermentation end-products present in silage. The purpose of this experiment was to study the influence of protein fermentation products (NH_3 , amines) on silage intake in sheep.

Two grass silages (20% DM) from the same direct cut were prepared without (WAS) and with formic acid (4.5 l/tonne) (FAS). The NH_3 -N as a percentage of N_{total} was 12.3% and 5.8%, whereas the amine content was 7.1 and 1.1 g/kg DM, respectively. Effects of NH_3 (N) and amines (A) on dry matter intake (DMI) and intake behaviour were separated by adding these to FAS: FAS + N (12.2% NH_3 -N/ N_{total}); and FAS + A (3.6 g amines/kg DM). These silages correspond to 4 treatments and were offered *ad libitum* once per day to 4 wethers (68 ± 5 kg) according to a latin square design.

Table I shows the currently observed difference (15%) in DMI between well and poorly pre-

served silages (*ie* FAS and WAS). In contrast to addition of NH_3 , the addition of amines to FAS tended to decrease DMI. Reduced DMI for WAS and FAS + A was the result of a reduction ($P < 0.05$) in intake rate, while daily time spent eating was equal for the 4 silages (348 min). Initial intake rate is an indicator for forage palatability, which was low for WAS and reduced by the addition of amines (FAS + A). This decrease in palatability may partially explain the reduced intake of WAS and FAS + A. Chemostatic regulation could explain the lower duration of the main meal for WAS, because rumen fill was similar for WAS and FAS (10.1 kg fresh material vs 10.7 kg).

In conclusion, NH_3 does not seem to affect intake in poorly preserved silages. Fermentation products related to NH_3 (*eg*, amines) might be responsible for reducing intake. To test this hypothesis, larger quantities of amines might be required.

Table I. Daily dry matter intake (DMI) and parameters of intake behaviour.

| | WAS | FAS | FAS + N | FAS + A | rsd* |
|----------------------|--------------------|--------------------|--------------------|---------------------|------|
| DMI (g DM/day) | 1 249 ^b | 1 475 ^a | 1 475 ^a | 1 308 ^{ab} | 124 |
| Intake rate (g/min) | 3.74 ^b | 4.31 ^a | 4.30 ^a | 3.56 ^b | 0.22 |
| Main meal | | | | | |
| DM intake (g) | 274 ^b | 465 ^a | 452 ^a | 407 ^{ab} | 84 |
| Duration (min) | 53 ^a | 71 ^a | 67 ^a | 77 ^a | 15 |
| Intake rate (g/min) | 5.34 ^b | 6.67 ^{ab} | 6.82 ^a | 5.48 ^{ab} | 0.77 |
| Initial rate (g/min) | 10.23 ^b | 13.92 ^a | 13.90 ^a | 11.44 ^{ab} | 1.69 |

* Residual standard deviation; means with same superscripts are not significantly different, $P > 0.05$.