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## Summary only

# THE EFFECT OF FORMALDEHYDE TREATMENT ON THE CHEMICAL COMPOSITION, APPARENT DIGESTIBILITY AND VOLUNTARY INTAKE OF SILAGE BY SHEEP

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IN two experiments clover-dominant pasture was treated with solutions of formaldehyde (HCHO) prior to conservation as high-moisture silage.

### EXPERIMENT 1

Formaldehyde was applied to herbage at the rates of 0, 0.6, 1.1, 2.2 and 4.4%, respectively, of the dry matter and the herbage was then ensiled in polythene containers (15 kg). The formaldehyde was applied in the form of 2.5, 5.0, 10.0 and 20.0% (w/v) solutions.

From 0 to 2.2% HCHO, increasing rates of HCHO decreased the content of acetic acid ( $P < 0.05$ ), increased the content of a compound identified as 2,3-butanediol ( $P < 0.05$ ) but had no effect on silage pH (4.74 units). The 4.4% rate decreased the concentrations of acetic acid and 2,3-butanediol to very low levels and increased the pH to 5.02 units ( $P < 0.01$ ). The two higher rates of HCHO increased the proportion of nitrogen present as true protein and decreased ammonia production when the silages were incubated with rumen micro-organisms *in vitro*.

### EXPERIMENT 2

Untreated herbage and herbage treated with HCHO at 1.7% of the dry matter were ensiled in 6,000 kg polythene-covered stacks. The HCHO was applied as commercial formalin (40% w/v HCHO) at the rate of 9.5 l/1,000 kg (2.1 gal/ton) of material harvested.

The silage stacks were opened after a storage period of 3 months. Secondary fermentation was apparent in a 30 cm deep surface layer of the HCHO-treated silage. After discarding this material, the two silages were fed to Romney wether hoggets over a period of 6 weeks.

Formaldehyde treatment decreased the content of acetic, propionic, n-butyric and lactic acid in silage and

increased pH from 5.08 to 5.64 units ( $P < 0.01$ ). The compound 2,3-butanediol was present at 2.4% of the dry matter and was not affected by HCHO treatment. The treatment increased the proportion of nitrogen present as true protein, decreased the proportion of nitrogen present as ammonia and reduced the osmotic pressure of silage juice by 25%.

The apparent digestibility of energy and nitrogen, determined at the maintenance level of intake, were, respectively, 2.6 and 7.0 units less on HCHO-treated than on untreated silage.

Voluntary dry matter intakes, measured during weeks 5 and 6, were, respectively, 48.3, 62.7, 74.4, and 73.1 g/kg  $W^{0.75}$  for untreated silage, untreated silage + intraperitoneal D-L methionine (2.4 g/2 days), HCHO-treated silage and HCHO-treated silage + intraperitoneal D-L methionine. The main effect of HCHO treatment was highly significant ( $P < 0.01$ ) and the effect of methionine was significant on untreated silage ( $P < 0.05$ ). The corresponding figures for wool growth were 2.4, 5.3, 4.5 and 7.0 g/day, respectively, the effects of HCHO treatment and methionine being significant ( $P < 0.01$ ).

It is considered that HCHO-treatment offers considerable potential for increasing the voluntary intake of silage, but that the problem of secondary fermentation will have to be overcome before the process can be recommended for general farm practice.