Short communication

The effect of calcium hydroxide and urea treatment of barley straw on chemical composition and digestibility in vitro

M.S. Zaman*, E. Owen

Department of Agriculture, University of Reading, Earley Gate, P.O. Box 236, Reading RG6 2AT, UK

Received 8 September 1993; accepted 26 April 1994

Abstract

An experiment was conducted to investigate the effectiveness of calcium hydroxide (Ca(OH)₂) and urea treatment of straw. Chopped barley straw was treated with mixtures of Ca(OH)₂ (0, 30 and 60 g kg⁻¹ straw dry matter, DM) and urea (0, 30 and 60 g kg⁻¹ straw DM) dissolved in 0.8 l water kg⁻¹ straw OM and 'ensiled' in a polythene bag (1.0 kg per bag) at 15 °C or 25 °C for 60 days. Control treatment at each temperature involved untreated straw and treatment with 30 or 60 g NaOH kg⁻¹ straw OM dissolved in 0.8 l water kg⁻¹ straw OM. Ensiled straws were examined for mould, chemically analysed and assessed for organic matter digestibility (OMD) in vitro.

Mould occurred in Ca(OH)₂-alone and water-alone ensiled straw, but other ensiled straws were apparently mould free. In the presence of Ca(OH)₂ with urea treatment, the nitrogen content of ensiled straw increased more than urea-alone treatment. Analysis of variance of OMD in vitro results showed that Ca(OH)₂, urea and temperature interact significantly (P<0.01). Interactions were found to be non-significant for other parameters (nitrogen, acid detergent fibre and hemicellulose). However, straw ensiled at 15 °C with 30 g urea + 60 g Ca(OH)₂ kg⁻¹ straw DM, 60 g urea + 60 g Ca(OH)₂ kg⁻¹ straw DM or 30 g NaOH kg⁻¹ straw DM had similar OMD in vitro (67%). Untreated straw OMD was 48.5%. It can be concluded that mixtures of Ca(OH)₂ and urea would be the alternative chemicals to NaOH or ammonia for improvement of the nutritive value of straw.

Keywords: Barley; Straw; Calcium hydroxide treatment; Urea treatment