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A kinetic study of ammoniation of straw either *via* the hydrolysis of urea or by anhydrous ammonia

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The aim of this work was to compare the kinetics of straw upgrading using ammonia either in anhydrous form or from urea hydrolysis.

Wheat straw was ground (1 cm screen) and treated at 30 °C, in closed glass jars of 850 ml, by iso-ammonia doses (5.3 g/100 g straw DM), coming from 1° urea and ground soybean (1.6 g/100 g straw DM) (US), moistened at 30%; 2° anhydrous ammonia, (AA) at 30% straw moisture (AA₃₀), and 3° AA at 15% straw moisture (AA₁₅). On opening, the samples were dried at 35 °C, nitrogen (Kjeldahl) and urea were determined. Organic matter digestibility (OMDd) was estimated by densitometry (Besle *et al*, 1989).

After AA, the fixation of N rapidly reached a maximum (in 10 d, fig 1a), while the increase of OMDd was more

progressive (fig 1b). After US, the same pattern was observed, but at a lower rate. This was due to the slow ureolysis, but also, mainly for OMDd, to the coproducts of ammonia formation, carbamate, CO₃²⁻, which reduced the pH of the medium. However, after 4 weeks, OMDd of US and AA₁₅ straws were close.

In conclusion, It is likely that, in upgrading straw with urea, the kinetics of nitrogen and energetic values differ, but after a while, the maximal values reached are close to that reached with AA, especially with the usual AA₁₅.

Besle JM, Signoret C, Chenost M, Aufrere J, Jamot J (1989) *In: Evaluation of Straws in Ruminant Feeding* (Chenost M, Reininger P, eds) Elsevier, London, 134-143

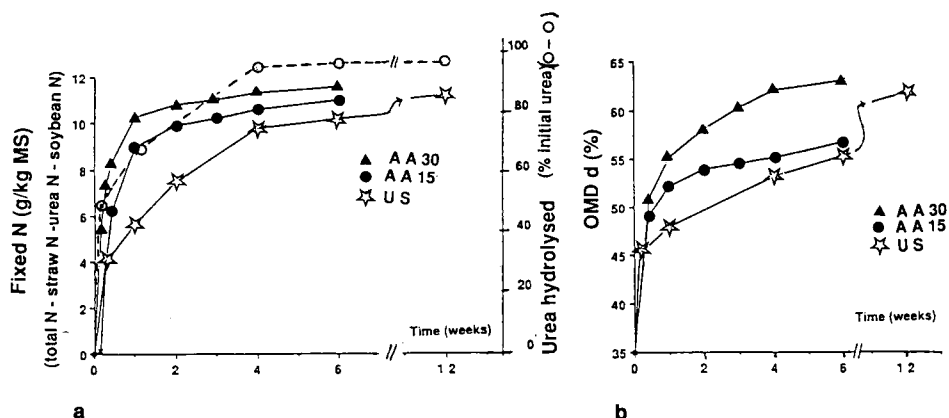


Fig 1. (a) Ureolysis, fixed N; and (b) OMDd, of AA and US treated straws.