THE USE OF VARIOUS COMBINATIONS OF UREA AND WATER TREATMENT TO IMPROVE THE NUTRIENT CONTENT AND IN SACCO DISAPPEARANCE OF RHODES GRASS HAY (Chloris gayana cv. Callide)

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Urea or ammonia treatment of low-quality temperate forages and crop residues is widely used to increase their intake and digestibility (Fahey \textit{et al.} 1993). Given that the low intake and digestibility of tropical grasses can limit meat and milk production, it would be advantageous if the benefits of urea or ammonia treatment could be obtained with tropical grasses. The improvement in nutrient content and digestibility of forages treated with ammonia or urea depends on the dry matter content of the feedstuff being treated (Sundstol \textit{et al.} 1978, Dryden and Leng 1986). No observations could be found in the literature concerning optimum combinations of urea and water required to maximise the nutrient content and digestibility of tropical grasses.

In a factorial experiment replicated three times, 500 g DM samples of chaffed Rhodes grass hay were treated with five levels of urea (0, 20, 40, 60, and 80 grams of urea/kg DM) and three levels of added water (250, 500 and 750 grams of water/kg DM). The treatments were made by adding the urea/water solution to Rhodes grass chaff preweighed into plastic bags. After mixing, the samples were stored at 22°C for 28 days. Significant interactions between urea and water, and significant main effects of urea and water on nutrient content and \textit{in sacco} digestibilities are shown in Table 1. Responses to urea are similar to those reported for temperate low-quality roughages treated with urea or ammonia. The effects of water should be further examined. Urea treatment should improve the nutritional value of conserved tropical grasses for ruminants provided that optimum urea/water combinations are defined.

\begin{table}[h]
\centering
\caption{Interactions between urea ($X_1$; g/kg DM) and water ($X_2$; g/kg DM), and significant main effects of urea and water on the variables ($Y$; g/kg DM) of nutrient content and 48 hour \textit{in sacco} digestibilities}
\begin{tabular}{llllll}
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Variable & Regression & $P$ & $R^2$ & s.e. \textsuperscript{a} \\
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Protein & $Y = 97.6 + 2.84 X_1 - 0.00240 X_1 X_2$ & 0.0001 & 0.92 & 15.8 \\
Neutral detergent fibre & $Y = 747 - 1.77 X_1 - 0.254 X_2 + 0.00579 (X_1)^2 + 0.00211 (X_2)^2 + 0.000292 (X_1 X_2)$ & 0.0001 & 0.80 & 9.4 \\
 & & & & & \\
\textit{In sacco} dry matter digestibility & $Y = 684.4 + 0.0012 X_1 X_2$ & 0.0001 & 0.52 & 20.3 \\
\textit{In sacco} organic matter digestibility & $Y = 685.6 + 0.0013 X_1 X_2$ & 0.0001 & 0.55 & 21.2 \\
Main effect - urea & & & & & \\
Acid detergent fibre & $Y = 358 - 0.211 X_1$ & 0.0009 & 0.25 & 10.6 \\
Acid detergent lignin & $Y = 40 - 0.062 X_1$ & 0.0024 & 0.10 & 5.4 \\
Main effect - water & & & & & \\
Acid detergent fibre & $Y = 342 + 0.067 X_2$ & 0.0427 & 0.08 & 11.7 \\
Acid detergent lignin & $Y = 29 + 0.017 X_2$ & 0.0001 & 0.37 & 4.5 \\
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\end{tabular}
\textsuperscript{a}Standard error of regression
\end{table}