

Studies on the effect of NH_4HCO_3 treatment on roughage degradation and rumen microbial synthesis

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Corn stover and rice straw are two main kinds of roughages fed to ruminants in China. The present research was carried out to study the effects of NH_4HCO_3 treatment on their degradation estimated with nylon bag method and the microbial synthesis measured with rumen simulation technique (RST). 10 % NH_4HCO_3 and 40 % water were added to corn stover and rice straw on DM basis, and heated at 65°C for 7 hours. Four roughage samples, corn stover (CS), treated corn stover (TCS), rice straw (RS) and treated rice straw (TRS), were prepared.

The nylon bag method (Ørskov and McDonald, 1979, J Agric Sci, 92, 499-503) and the equations $dp = a + b(1 - e^{-ct})$ and $P = a + (bc/(c + k))$ were used to study the degradation kinetic changes of untreated and treated samples (see table). For both corn stover and rice straw, NH_4HCO_3 treatment did not change the rapid degradable fraction "a" ($P > 0.05$), but improved the potential degradable part "b" and the degradation rate

constant "c" ($P < 0.05$). The treatment increased the effective degradability P of corn stover by 8.9 percentage units ($P < 0.05$) and of rice straw by 8.0 percentage units ($P < 0.05$).

The results from RST showed that NH_4HCO_3 treatment increased the amount of fermentable OM (FOM), non ammonia N (NAN) and microbial N (MN) for both roughages ($P < 0.05$). The efficiencies of microbial synthesis (MN/FOM, g/kg) were not different for CS, TCS, RS and TRS ($P > 0.05$).

In conclusion, NH_4HCO_3 treatment can increase the fermentable OM of CS and RS in the rumen, mainly from "b" fraction and "c" without changing "a" fraction. The effective degradabilities can be improved from 37.3 % to 46.2 % for CS and from 35.5 % to 43.5 % for RS. The treatment of CS and RS with NH_4HCO_3 can increase the amount of FOM and MN synthesis with no influence on the fermentable energy efficiencies.

		CS	TCS	RS	TRS
<i>Nylon bag method</i>					
parameters :	a	13.8	13.1	15.7	14.9
	b	48.3	58.3	39.6	54.8
	c	0.0312	0.0434	0.0329	0.0360
	p	37.3	46.2	35.5	43.5
(outflow rate constant K = 0.0333)					
<i>RST technique</i>					
	FOM (% OM)	47.6	54.0	45.4	52.8
	NAN (mg/d)	720	770	700	760
	MN (mg/d)	494	554	483	540
	MN/FOM (g/kg)	22.4	24.2	23.3	23.9