

## EFFECTS OF TREATING WHEAT STRAW WITH SODIUM HYDROXIDE AND SODIUM BICARBONATE ON MINERAL ABSORPTION IN CATTLE

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Treatment of cereal straws with NaOH increases their intake and digestibility sufficiently to make them attractive as alternative sources of medium quality roughages. When NaOH-treated straws are fed as the sole diet (Kellaway et al. 1978) high levels of Na intake may interfere with absorption of other minerals.

Mineral retention and sites of absorption were measured using four steers fitted with rumen, abomasal and ileal cannulas. Each of the steers was fed untreated, NaOH-treated (50 g NaOH/kg) and Na<sub>2</sub>CO<sub>3</sub>-treated (66 g Na<sub>2</sub>CO<sub>3</sub>/kg) wheat straw *ad lib.* in three successive periods of 17 days duration. The diets also were sprayed with urea, sulphuric acid and phosphoric acids, supplying 17.8, 1.2 and 3.0 g N, S and P/kg respectively, and mixed with limestone supplying 3.2 g Ca/kg. Cr-EDTA infused into the rumen, and acid-detergent lignin were used as markers for digesta flows.

TABLE 1 Intake (I), abomasal (A), ileal (Il), faecal (F) and urinary (U) flows and retentions (R) of Mg, Na and K (g/d) in steers eating wheat straw untreated (O), treated with NaOH and Na<sub>2</sub>CO<sub>3</sub>

|    |                                 | I     | A     | Il    | F    | U     | R      |
|----|---------------------------------|-------|-------|-------|------|-------|--------|
| Mg | O                               | 3.2   | 3.2   | 4.0   | 3.0  | 0.4   | - 0.3  |
|    | NaOH                            | 3.7   | 3.8   | 4.3   | 3.3  | 0.4   | + 0.01 |
|    | Na <sub>2</sub> CO <sub>3</sub> | 3.0   | 4.9   | 4.7   | 3.7  | 0.6   | - 1.2  |
|    | SEM                             | 0.16  | 0.35  | 0.28  | 0.45 | 0.05  | 0.49   |
| Na | O                               | 8.2   | 110.3 | 98.2  | 7.1  | 1.3   | - 0.2  |
|    | NaOH                            | 155.5 | 173.0 | 132.1 | 36.8 | 122.3 | - 3.5  |
|    | Na <sub>2</sub> CO <sub>3</sub> | 147.0 | 197.2 | 139.8 | 35.9 | 115.1 | - 4.0  |
|    | SEM                             | 7.14  | 15.91 | 16.45 | 2.19 | 16.90 | 22.31  |
| K  | O                               | 33.6  | 66.3  | 65.1  | 23.5 | 19.3  | - 9.3  |
|    | NaOH                            | 38.8  | 55.8  | 17.4  | 6.0  | 48.9  | -16.1  |
|    | Na <sub>2</sub> CO <sub>3</sub> | 39.7  | 66.9  | 20.6  | 5.7  | 46.7  | -12.7  |
|    | SEM                             | 3.15  | 7.17  | 5.58  | 0.55 | 6.72  | 6.53   |

Most Mg was absorbed posterior to the ileum on the three diets. Mg flows at the abomasum and urinary excretions were greater with Na<sub>2</sub>CO<sub>3</sub> treatment than on the other two diets ( $P < 0.05$ ). Na was absorbed in the small intestine and hind-gut. The ratios of absorption between these sites were 1:7, 1:2 and 1:2 on untreated, NaOH-treated and Na<sub>2</sub>CO<sub>3</sub>-treated diets. On the two treated diets, Na flows at the abomasum, and faecal and urinary excretions were higher than on the untreated diet ( $P < 0.01$ ). K was also absorbed in both the small intestine and hind-gut. The ratios of absorption between these sites were 1:36, 1:0.3 and 1:0.3 on untreated, NaOH-treated and Na<sub>2</sub>CO<sub>3</sub>-treated diets respectively. On the treated diets, ileal flows were lower ( $P < 0.01$ ), faecal output was lower ( $P < 0.001$ ) and urinary output was higher ( $P < 0.05$ ) than on the untreated diet.

Despite the major shifts in mineral absorption due to high Na intakes, retentions of Na, K and Mg did not differ significantly between diets ( $P > 0.05$ ).

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