EFFECT OF DIETARY BINDER AND ACID SALTS ON URINARY pH IN CATTLE FED LIVE EXPORT DIETS

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High environmental temperatures during sea travel from Western Australia to the Middles East are associated with instances of elevated atmospheric ammonia (Stacey 2001). Diets that are currently used for live export can result in a urinary pH of around 8.0. Lime (calcium oxide), which is often used as a binder in export pellets, has the potential to form calcium hydroxide upon hydration and, thus, increase urinary pH. Hendricks *et al*. (1997) have demonstrated that addition of acid salts, such as calcium chloride or ammonium chloride, to diets can be used successfully to decrease ammonia emissions from pig facilities. In addition, it is well known in the dairy industry that acidic salts can be used to reduce urine pH. This experiment evaluated the best combination of pellet binders, such as lime and gypsum, with acid salts, such as calcium chloride or ammonium chloride, to decrease urinary pH in cattle.

Eighty-six 18-month old Angus-cross heifers were placed in individual pens and fed hay *ad libitum* for 5 days, and then randomly allocated on a liveweight basis to 1 of 6 experimental diets (see Table 1). Animals were fed the diets at a rate of 2.25% of body weight on a DM for 21 days, when final samples were collected. Urinary pH was measured on the last day of hay feeding period (day 0), and on day 14 of the pellet feeding period in all animals, while on days 7 and 21, urinary pH was measured in a sample of 42 animals (7 animals from each treatment). All samples were collected approximately 4-6 h post feeding.

Table 1. Composition of experimental diets and urinary pH ± standard errorat day 14 .

Diet (n)	Hay (%)	Barley (%)	Lupins (%)	Lime (%)	Gypsum (%)	$CaCl_2$ (%)	NH_4Cl (%)	Urine pH at day 14
1 (13)	49.5	30	18	2	0.5	0	0	7.62 ± 0.2^{c}
2 (14)	51.5	30	18	0	0.5	0	0	6.89 ± 0.25^{b}
3 (12)	48.1	30	18	2	0.5	1.4	0	5.47 ± 0.07^{a}
4 (14)	50.1	30	18	0	0.5	1.4	0	5.53 ± 0.13^{a}
5 (12)	48.5	30	18	2	0.5	0	1	5.34 ± 0.14^{a}
6 (13)	50.5	30	18	0	0.5	0	1	5.4 ± 0.9^{a}

n= number of animals per diet. Means for urine pH with different superscripts differ significantly ($P<0.05$).

Eight animals were removed from the experiment (with no bias towards any of the diets) for either refusing to eat the pellets or because they escaped from their individual pens. Table 1 shows the results for urinary pH of each dietary treatment on day 14. Over all sampling periods, calcium chloride and ammonium chloride both significantly reduced urine pH compared with gypsum/lime and gypsum alone. Ammonium chloride and calcium chloride were equally effective in lowering urinary pH compared with diets containing 2% lime. This effect on lowering urinary pH occurred even in the presence of 2% lime.

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