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Effect of buffers and supplemental potassium in diets of early-weaned calves

Abstract

Potassium chloride added to the prestarter and/or potassium bicarbonate added to the starter fed to early weaned calves helped maintain normal blood alkalinity and normal levels of blood gases, and resulted in a trend toward increased feed consumption. Potassium bicarbonate added to the starter tended to improve weight gains.; Dairy Day, 1986, Kansas State University, Manhattan, KS, 1986;

Keywords

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K**EFFECT OF BUFFERS AND SUPPLEMENTAL POTASSIUM****S****IN DIETS OF EARLY-WEANED CALVES****U**

K.J. Jordan, J.L. Morrill, P.G. Reddy,

J.J. Higgins¹, and N.V. Anderson²**Summary**

Potassium chloride added to the prestarter and/or potassium bicarbonate added to the starter fed to early weaned calves helped maintain normal blood alkalinity and normal levels of blood gases, and resulted in a trend toward increased feed consumption. Potassium bicarbonate added to the starter tended to improve weight gains.

Introduction

A program for young calves has been developed here that results in earlier dry feed consumption, earlier development of rumen fermentation, and allows earlier weaning. Because active rumen fermentation is established earlier, a buffer in the feed may be helpful to prevent excess rumen acidity. Also, potassium may be deficient in rations that do not contain liberal amounts of roughage. This experiment was designed to evaluate the effect of addition of potassium salts to the prestarter and/or starter used in the program.

Procedures

Thirty-six day-old Holstein calves were assigned to one of four treatment groups. Diets were control prestarter or prestarter containing 1.5% potassium chloride (KCl), each fed with either control starter or starter containing 2% potassium bicarbonate (KHCO₃). The control prestarter and control starter were the same as used by Morrill et al. (1985 Dairy Day, Report of Progress 484, page 1), except that dehydrated alfalfa was used in the starter instead of alfalfa hay. Weight gains and feed consumption to 6 weeks of age were recorded and venous blood was sampled weekly for determination of pH, blood gases, and sodium and potassium in serum, and red blood cells.

Results and Discussion

Treatment means for feed consumed and weight gained were not significantly different, but there was a trend for more starter consumption and weight gain when buffered starter was fed (Table 1). Buffered starter and KCl in the prestarter were helpful in maintaining homeostasis in the blood (Table 2). Serum and red blood cell levels of sodium and potassium were not affected by diet.

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Table 1. Effect of ration on feed consumption and weight gains

| Diet | Weekly Feed Consumed, lb | | Weight Gain, lb |
|---|--------------------------|---------|-----------------|
| | Prestarter | Starter | |
| Control prestarter, control starter | 2.16 | 7.41 | .77 |
| Control prestarter, KHCO_3 starter | 2.18 | 8.71 | .95 |
| KCl prestarter, control starter | 2.13 | 7.68 | .79 |
| KCl prestarter, KHCO_3 starter | 2.22 | 8.38 | .88 |

Table 2. Effect of ration on blood parameters

| Diet | pH | HCO_3^- ¹ | CO_2 ² | BE ³ |
|---|--------------------|-------------------------------|----------------------------|-------------------|
| Control prestarter, control starter | 7.337 ^a | 27.59 ^a | 52.79 ^a | 2.57 ^a |
| Control prestarter, KHCO_3 starter | 7.352 ^a | 29.05 ^b | 54.48 ^a | 4.14 ^b |
| KCl prestarter, control starter | 7.352 ^a | 28.87 ^b | 54.18 ^a | 4.00 ^b |
| KCl prestarter, KHCO_3 starter | 7.350 ^a | 29.15 ^b | 54.89 ^a | 4.14 ^b |

¹Venous blood bicarbonate (meg/liter).

²Venous blood partial pressure of carbon dioxide (mm Hg).

³Venous blood base excess (meg/liter).

^{a,b}Means in a column bearing different superscripts differ ($P < .05$).

Recommendations

Based on results of this experiment and others, buffer should be added to starters used in early weaning programs. Either sodium bicarbonate or potassium bicarbonate would be useful. Studies are underway to determine optimum levels of potassium and to evaluate other buffers. Until more results are available to use as a guide, 2% sodium or potassium bicarbonate should be used, and this is more critical if long hay is not available.