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Richard M. Luther  
*South Dakota State University*

M. Goetz  
*South Dakota State University*

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## WHOLE SHELLED CORN WITH AND WITHOUT SODIUM BICARBONATE FOR FINISHING BEEF STEERS

R. M. Luther, R. J. Emerick and M. Goetz  
Department of Animal and Range Sciences

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### Summary

A total of 160 steers were fed a whole corn-no roughage diet without a buffer or with sodium bicarbonate at a level of .87% of the dry diet. The finishing period of 112 days followed the feeding of a high corn silage diet. Overall feed intake, weight gains and feed conversion were similar ( $P > .05$ ) for steers supplemented with sodium bicarbonate as for those that did not receive the buffer. Small period differences in performance that were observed between treatments were not significant ( $P > .05$ ). Carcass characteristics were similar for the control and sodium bicarbonate treatments.

(Key Words: Whole Corn, Sodium Bicarbonate, Finishing Cattle.)

### Introduction

Early research at the South Dakota (A.S. Series 69-4 and 70-18) and Minnesota Experiment Stations has shown little difference in performance of finishing yearling cattle fed shelled corn in either whole, ground or rolled form. Carcass characteristics also were not affected by the form of corn fed. These previous studies utilized diets containing limited amounts of roughage, presumably to aid rumen function.

The utility of high grain-no roughage diets for finishing cattle has been considered to be a way of reducing costs of feedlot gains. Less processing is required with whole corn diets and feed handling can be simplified. However, it must be recognized that greater emphasis may need to be placed on feed bunk and cattle management to minimize digestive disturbances. Under these conditions the feeding of buffers may have the greatest potential for providing benefits. Buffers may neutralize ruminal acids and thus improve animal performance.

This experiment was conducted to compare performance of cattle fed whole shelled corn with and without the buffering agent sodium bicarbonate<sup>1</sup>.

### Experimental Procedure

One hundred sixty Angus, Hereford and Hereford x Angus crossbred steers (avg 815 lb) were used in the experiment. The cattle had been previously fed a high corn silage-supplement diet for 110 days. The steers were not reallocated and 20 pens were used with eight steers per pen. Eighty steers were fed a corn-soybean

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<sup>1</sup>Church and Dwight Co., Inc., Piscataway, NJ, 08854.

meal supplement fortified with vitamins and minerals. The remaining 80 steers were fed a similar supplement containing 5.8% (dry basis) sodium bicarbonate. Sodium bicarbonate was added at the expense of corn, while soybean meal was increased to maintain crude protein content equivalent to the control supplement. All supplements contained Rumensin<sup>2</sup> at 105 mg per pound of supplement. The supplements were made into one-fourth inch pellets and batch mixed with whole corn at time of feeding. The mixed diets were formulated to contain 85% whole corn and 15% supplement (dry basis).

Cattle were weighed at 28-day intervals. Initial and final weights were obtained following overnight withdrawal of feed and water.

Feedlot performance is presented for each 28-day period and for the overall experiment. The weight gains for periods are based on filled weights. The overall data are based on initial and final shrunk weights. Consideration of fill must therefore be given in evaluating period data.

### Results and Discussion

Whole corn was readily consumed (table 1) with no effect ( $P > .05$ ) of bicarbonate supplementation on feed intake in either the period data or for the overall trial. The steers consumed about .16 lb sodium bicarbonate daily (avg .87% of the dry diet). Digestive disturbances were not observed in either the control or the bicarbonate-fed cattle. One steer in a control lot died near the end of the experiment. Necropsy revealed a physiological condition which was not related to dietary treatment.

Small differences ( $P > .05$ ) between control and bicarbonate treatments in each of the last three periods (28 to 56, 56 to 84 and 84 to 112 days) were probably related to gut fill (table 2). Overall, control steers gained at a rate of 2.96 lb/day compared to 2.85 lb/day for steers fed sodium bicarbonate. The differences were not significant ( $P > .05$ ).

Overall feed conversions, shown in table 3, were similar. Feeding whole corn with sodium bicarbonate resulted in feed requirements of 648 lb of dry feed per 100 lb gain compared to 624 lb for diets without the buffer.

Previous experiments conducted with lambs and steers at our feedlots indicate some improvement in performance with sodium bicarbonate feeding early in the feeding period. However, this advantage for buffer feeding usually was not maintained in the latter portion of the feeding period. In this trial, an early response to buffer feeding was not observed where a whole corn-no roughage diet was fed.

Data for some carcass characteristics are presented in table 4. There were no important differences ( $P > .05$ ) in the various carcass measurements. Yield grade tended to be lower ( $P > .05$ ) for cattle fed sodium bicarbonate (2.55) than for controls (2.68). Incidence of abscessed livers was low in this study with only five occurring in control steers (6.3%) and seven occurring in bicarbonate-fed steers (8.7%). There were no advantages to feeding sodium bicarbonate with a high corn-no roughage diet under the conditions of this experiment.

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<sup>2</sup>Elanco Products Company, Indianapolis, IN, 46206.

TABLE 1. CUMULATIVE FEED INTAKE BY WEIGH PERIODS AS AFFECTED BY SODIUM BICARBONATE SUPPLEMENTATION

| Item                             | Control | Sodium bicarbonate |
|----------------------------------|---------|--------------------|
| Avg daily feed <sup>a</sup> , lb |         |                    |
| Period 1                         | 12.69   | 12.70              |
| Period 2                         | 19.86   | 19.88              |
| Period 3                         | 20.50   | 20.50              |
| Period 4                         | 20.66   | 20.61              |
| Overall (112 days)               | 18.43   | 18.42              |

<sup>a</sup> Dry matter basis.

Period 1 = August 7 to September 4, 28 days.

Period 2 = September 4 to October 2, 28 days.

Period 3 = October 2 to October 30, 28 days.

Period 4 = October 30 to November 27, 28 days.

TABLE 2. CUMULATIVE WEIGHT GAIN BY PERIODS AS AFFECTED BY SODIUM BICARBONATE SUPPLEMENTATION

| Item                       | Control | Sodium bicarbonate |
|----------------------------|---------|--------------------|
| No. of steers <sup>a</sup> | 79      | 80                 |
| Init. shrunk wt., lb       | 816     | 815                |
| Final shrunk wt., lb       | 1147    | 1134               |
| Avg daily gain, lb         |         |                    |
| Period 1                   | 3.52    | 3.56               |
| Period 2                   | 3.11    | 2.59               |
| Period 3                   | 2.58    | 2.73               |
| Period 4                   | 2.62    | 2.51               |
| Overall (112 days, shrunk) | 2.96    | 2.85               |

Period 1 = August 7 to September 4, 28 days.

Period 2 = September 4 to October 2, 28 days.

Period 3 = October 2 to October 30, 28 days.

Period 4 = October 30 to November 27, 28 days.

<sup>a</sup> One steer died of causes unrelated to experimental treatments.

TABLE 3. CUMULATIVE FEED EFFICIENCY BY WEIGH PERIODS AS AFFECTED  
BY SODIUM BICARBONATE SUPPLEMENTATION

| Item                            | Control | Sodium bicarbonate |
|---------------------------------|---------|--------------------|
| Feed to gain ratio <sup>a</sup> |         |                    |
| Period 1                        | 362     | 360                |
| Period 2                        | 647     | 787                |
| Period 3                        | 811     | 777                |
| Period 4                        | 794     | 832                |
| Overall (112 days, shrunk)      | 625     | 648                |

Period 1 = August 7 to September 4, 28 days.

Period 2 = September 4 to October 2, 28 days.

Period 3 = October 2 to October 30, 28 days.

Period 4 = October 30 to November 27, 28 days.

<sup>a</sup> All feeds were on dry matter basis.

TABLE 4. CARCASS CHARACTERISTICS AS AFFECTED BY  
SODIUM BICARBONATE SUPPLEMENTATION

| Item                        | Control | Sodium bicarbonate |
|-----------------------------|---------|--------------------|
| No. carcasses               | 79      | 80                 |
| Hot carcass wt., lb         | 720.1   | 713.2              |
| Marbling score <sup>a</sup> | 5.30    | 5.18               |
| Quality grade <sup>b</sup>  | 19.35   | 19.15              |
| Yield grade                 | 2.68    | 2.55               |
| Abscessed livers            | 5       | 7                  |

<sup>a</sup> Small = 5; modest = 6.

<sup>b</sup> Low choice = 19; average choice = 20.