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Effect of niacin supplementation on milk production and ketosis of dairy cattle

Authors

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K EFFECT OF NIACIN SUPPLEMENTATION ON MILK PRODUCTION
AND KETOSIS OF DAIRY CATTLE¹**S****U**G. Dufva, E. Bartley², A. Dayton, and D. Riddell

Summary

Two lactation trials were undertaken to evaluate the effect of a niacin supplement on milk production and the physiological symptoms of ketosis. Blood ketone and non-esterified fatty acid levels were lower and blood glucose concentrations higher in niacin-supplemented cows. These trends were exhibited regardless of whether supplementation began 2 wk prepartum or immediately after calving. A 6 g daily dose was found to be of equal or higher benefit than a 12 g supplement. Cows given niacin consistently produced more milk than controls, though the difference was small.

Introduction

Many high producing cows in early lactation exhibit borderline ketosis. High production imposes a strain on energy metabolism manifested in the elevated blood ketone and lowered blood glucose levels of the ketotic cow. Niacin, a B vitamin closely associated with energy metabolism, has been shown beneficial to milk production and persistency. Therapeutic doses have alleviated blood changes and increased milk production of ketotic cows. These experiments were to determine whether daily supplementation with small doses of niacin before or during peak lactation would prevent physiological symptoms of ketosis.

Procedures

In the first experiment, 20 cows were put in 2 groups receiving either 0 or 6 g niacin daily beginning 2 wk prepartum. After calving, cows in the treatment group were given 12 g niacin daily until 4 wk postpartum.

In a second trial, 4 groups of 10 cows were supplemented postpartum only with 0, 3, 6, or 12 g niacin per day. In both experiments, blood samples from all cows were taken at regular intervals for analysis of beta-hydroxybutyrate (ketone), non-esterified fatty acid, niacin, and glucose.

Alfalfa was offered ad libitum but a concentrate mixture was limited to 13 and 9 kg/hd/day in Trials 1 and 2, respectively.

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²Deceased.

Results and Discussion

In both experiments, supplemented cows consistently produced more milk than controls, though the difference was slight. No significant effects on milk composition were noted in the first trial, while milk fat percentages in Trial 2 were higher for niacin-supplemented cows up to 8 wk postpartum.

Blood levels of ketones and non-esterified fatty acids, typically high if energy imbalance occurs, were lower with niacin supplementation while glucose concentrations were higher. These trends were evident regardless of whether supplementation began in the dry period or immediately postpartum as in Trial 2. A 6 g dose was found to give a equal or greater response than the 12 g daily dose. Niacin concentrations in the red blood cells (RBC) of control cows dropped 16.5% during the first wk postpartum. Cows receiving dietary niacin maintained the same RBC levels before and after calving.

Results from these trials showed the greatest response to dietary niacin, both on the physiological symptoms of ketosis and on milk production, to occur between the second and fourth wk of lactation.

