The effect of excess calcium with borderline and deficient phosphorus in the rations of steer calves
by James K Lewis

A THESIS Submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of Master of Science in Animal Industry
Montana State University
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Abstract:
The results of two experiments involving 77 steer calves individually fed for 105 and 120 days, respectively, on rations containing adequate, borderline, or deficient phosphorus with normal or excess calcium are reported. Rations were supplemented with vitamins A and D, and with iodine, cobalt, copper, and manganese.

Feed consumed per 100 pounds body weight per day and average daily gains were reduced by borderline or deficient phosphorus intakes, Excess calcium added to a ration of borderline phosphorus content further reduced both feed consumption and rate of gain. However, when excess calcium was added to a deficient phosphorus ration, feed consumption was decreased, but rate of gain was not affected* The correlation coefficient between feed consumed per 100 pounds body weight and rate of gain was /0,640.

The phosphorus plasma levels were related in a general way to the phosphorus intake, but the calcium plasma level showed a characteristic fluctuation which was unaffected by treatments or by phosphorus plasma levels. The carotene plasma levels were inversely proportional to the phosphorus plasma levels and to the phosphorus intake and appeared to be directly proportional to the calcium intake. The symptoms of phosphorus deficiency in the order of their appearance were: impaired feed utilisation, reduction in rate of gain, poor feed consumption, depraved appetite, emaciation, rough hair coat, stiffness of the hind legs, enlargement of the knees and hocks, and alteration of body conformation. Depraved appetite was present In all lots and was partly attributed to the finely-divided state in which the ration was fed. Steers wintered on inadequate intakes of phosphorus with either normal or excess calcium made excellent gains on summer pasture and grain supplemented with phosphorus.

When phosphorus deficient steers were drenched with about 15 grams of phosphorus daily from monosodium phosphate there was marked improvement In feed consumption, feed efficiency, weight gains, vigor, and general appearance. A case of phosphate tetany in a steer is described which was induced by drenching with 0.76 grams per kilogram body weight of nonosodium phosphate. A digestion trial with lambs is reported which shows that the lignin used as a filler in the experimental rations had no effect on their digestibility.

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