

# Effects of Oral Administration of Magnesium Sulfate on Bovine Rumen pH, Rumen Protozoa and Serum Magnesium

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## Introduction

Magnesium oxide (MgO) is usually used in bovine practice for its laxative and antacid properties. However, side effects of its use are an increase in rumen pH, a change in numbers of protozoa and higher peripheral Mg levels, all of which may slow down the recovery process of the animal. Magnesium sulfate (MgSO<sub>4</sub>) offers an interesting alternative to MgO as laxative treatment. The association of magnesium with a weaker base such as the sulfate group may alleviate harmful side effects on rumen pH and protozoa. The aim of the present study was to evaluate the effect of orally administered magnesium sulfate on rumen pH, rumen protozoa, and serum magnesium in cattle. In addition, fecal consistency scores will be used to monitor the laxative effect of magnesium sulfate.

## Materials and Methods

The project was approved by the animal ethics committee of the faculty of veterinary medicine. Two groups of eight healthy dry cows were randomly assigned to Group 1 (G1: 0.5 lb (250g) MgSO<sub>4</sub>) or Group 2 (G2: 1.1 lb; 500g MgSO<sub>4</sub>). The cows were fasted 24 hours prior to oral administration of the MgSO<sub>4</sub>. A rumenocentesis was performed shortly before the treatment (D0) and 24 hours thereafter (D1). Rumen pH and protozoa were evaluated immediately. On D0, D1, D2, and D3 a general examination and fecal scoring (5 scales: 1=liquid, 5=dry) were performed and blood was drawn from the tail vein for biochemical and blood gas analysis. After the treatment, the previous feeding (hay ad lib) was reintroduced.

## Results

The treatment had no effect on physical parameters or blood analysis over the period studied in the

two groups. For both groups, the fecal scores were significantly lower the days following the treatment (Table 1), demonstrating the laxative effect of the MgSO<sub>4</sub>. The serum magnesium did neither vary significantly within the same group nor between the two groups over the evaluation period. For cows in G2 (1.1 lb; 500g of MgSO<sub>4</sub>), the maximal average value of serum magnesium varied from 0.86mmol/L at day 0 to 0.90mmol/L at day 1, which was within the normal range (0.70-0.91mmol/L). The average rumen pH was significantly higher on day 0 than on day 1 for both groups (Table 2). This higher pH on day 0 was most likely due to the fasting period just prior to the administration of MgSO<sub>4</sub>. Fasting can cause a physiological increase of rumen pH as a result of the fasting-induced decrease in volatile fatty acids (VFA) and a constant production of saliva. Values for the pH on day 1 of this study are within the physiological range. There were no significant differences in rumen protozoa populations between the two groups on day 0 and day 1.

## Significance

Magnesium sulfate (MgSO<sub>4</sub>), at a dose of 1.1 lb (500 g) in 4 liters of water, can be administered orally as a mild laxative in cattle. This treatment does not affect the pH and numbers of protozoa in the rumen, in contrast to the commonly used magnesium oxide (MgO). Furthermore, treatment with MgSO<sub>4</sub> does not seem to alter serum levels of magnesium. Further studies will have to validate the effects of MgSO<sub>4</sub> on sick animals.