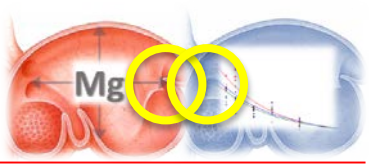
Magnesium absorption as influenced by the rumen passage kinetics in lactating dairy cows



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Introduction

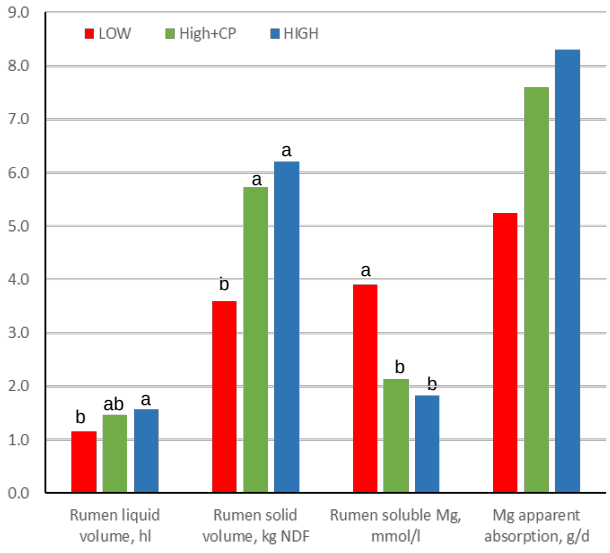
Potassium sensitive Mg absorption has been quantified with linear equations, but those vary highly in slopes. Additional dietary properties may play a role in Mg absorption through the rumen wall, such as suggested forage type or forage to concentrate ratio, likely associated to rumen passage kinetics.
The study aimed to assess the effects of rumen passage kinetics on apparent Mg absorption and retention in lactating dairy cows.

Material et Methods

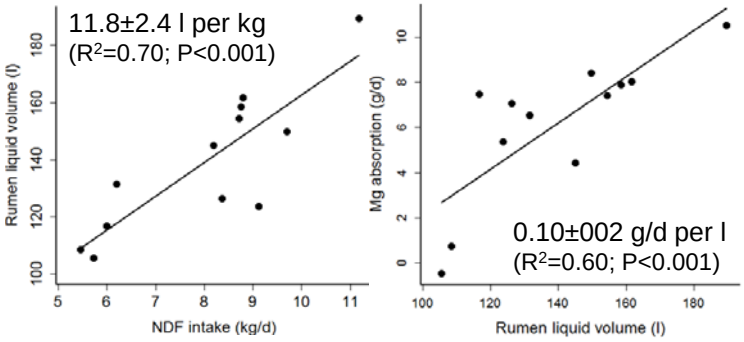
- Animals: 6 multiparous lactating Holstein cows (4 ruminally cannulated) in a 3 x 3 cross over design
- Treatments: 1. **LOW**: low NDF grass silage (341 g/kg DM) + concentrate LOW
  2. **HIGH**: high NDF grass silage (572 g/kg DM) + concentrate HIGH
  3. **High+CP**: diet High balanced in digestible protein with LOW using concentrate High+CP
  Diets with **constant concentrate proportion** (20% DMI); Diets ***iso*** in Ca, P, **Mg**, **K** and Na contents
- Rumen passage kinetics: **Marker** disappearance profiles of Co-EDTA and Yb labelled fibres

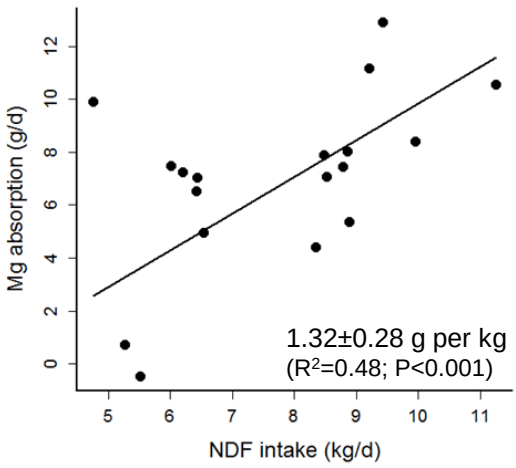
Results

- Effects of feeding **LOW** vs. HIGH and High+CP
  - 26% rumen liquid phase volume (P<0.05)
  + 100% Mg concentration in rumen fluid (P<0.001)
  + 14% higher Mg faecal excretion (P<0.01)
  - **7% Mg absorbability** (P<0.10):
    11.9%, **17.5%**, **18.9%**
  - 50% Mg urinary excretion (P<0.001)
- Effects of feeding **High+CP** vs. HIGH
  No effect on Mg absorption and retention (P>0.10)



- Relations and correlations





Conclusion

- Changing dietary NDF modified rumen passage kinetics properties, especially liquid and solid volumes.
- Mg absorption was dependent from rumen fluid volume and therefore from NDF intake.
- Increased rumen soluble Mg with in low fibre diet did not compensate the depressed Mg absorbability.
- In addition to the known antagonistic effect of dietary K, dietary fiber could provide a better prediction for Mg absorbability in the factorial method to estimate Mg requirement.
- The associated protein excess in low NDF herbage based diets neither affected rumen passage kinetics nor Mg absorption.

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