

# Estimation of DM mass in the digestive tract of sheep using a compartmental digesta kinetics model

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## Introduction

Compartmental models are frequently used to determine retention time of digesta in segments of the ruminant gut without surgical intervention, few calculate the mass of DM content in different compartments of the sheep gastrointestinal tract (GIT). In an attempt to develop an accurate, non-invasive system of determining DM mass in the GIT, we compared our model estimates of DM mass with actual mass measurements obtained from euthanized sheep.

## Methods

Seventeen Merino wethers, 33 months old ( $57.2 \pm 8.3$  kg) were held indoors and fed chaffed oaten/lucerne hay once daily at either 1.0x or 1.5x maintenance. Faecal samples were collected sequentially after administering a particle-phase marker (5 g of Cr-mordanted NDF). Patterns of excretion of Cr over time were fitted to a compartmental model using WinSAAM (Barnett 2013). Actual masses of DM contents in reticulum, rumen, omasum, abomasum, small intestine, large intestine, and caecum were obtained after euthanizing all animals.

## Results

Estimates of DM mass within the GIT of sheep by the model were moderately correlated (Reticulorumen  $r=0.63$ ,  $P<0.01$ ; Total GIT  $r=0.76$ ;  $P<0.01$ ) with measured DM mass obtained from sheep after euthanasia (Fig.1).

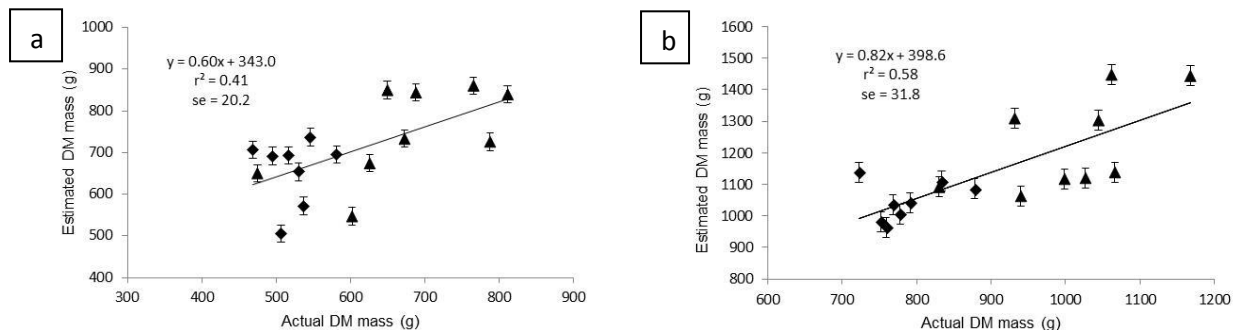


Fig.1. Relationship between estimated DM mass by compartmental model with actual values obtained from euthanized sheep in a) reticulorumen and b) total GIT when fed either 1.0x (♦) or 1.5x maintenance (▲) (mean  $\pm$  SEM).

## Discussion

While estimates of digesta mass were moderately correlated with actual values, further analysis of measured DM mass in segments of the sheep GIT will allow modification of the compartmental model to improve the accuracy of DM calculation in the sheep GIT. Such information may allow better characterisation of differences in nutrient supply and methane emissions between individual ruminants.

## References

Barnett, M.C. (2013) Impact of gut kinetics on methane production within the sheep. PhD Thesis, University of New England, Armidale, NSW.

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