

RUMEN DIFFERENCES BETWEEN SHEEP IDENTIFIED AS BEING LOW OR HIGH EMITTERS OF GREENHOUSE GAS

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ABSTRACT

Methane is known to be one of the main greenhouse gases contributing to climate change. A primary contributor to methane emissions are ruminants. It is estimated that over 50% of greenhouse gases in New Zealand are produced by the agricultural sector. Research using chambers has given the ability to collect accurate measurements on emissions, and animals have been identified as high and low emitters. Forty five ewes born in 2009, consisting of the top and bottom 10% of methane emitters (gCH₄/kgDMI) were computer tomography (CT) scanned in June 2012 (24 high and 21 low emitters). Animals were CT scanned using Cavalieri's theorem, with images collected at 15 mm intervals and a total of 30-32 images collected from each animal. The following rumen compartments; reticulum, rumen and atrium, ventral sac of rumen (rostral), dorsal sac of rumen and ventral sac of rumen were measured for volume, surface area, raft, liquid and gas volume, and weight. Data were analysed using R, and parsimonious models selected for the different response variables. Measurements between the two groups differed in range from 12% to 28% with high methane emitters having larger total surface area (12.35%), total volume (20.24%), and total raft volume and weight (26.8, 27.8 respectively). The results indicate that ruminants from high methane emitters have larger volumes compared to low methane emitting sheep. In conclusion it would appear that selection for reduced methane emissions has resulted in a correlated change in rumen size in ewes.