

How Often Do We Need to Measure Methane Production in Ruminants to Establish Robust Phenotype?

David S. Lines^A, John P. Goopy^B, John V. Nolan^C

^AUniversity of Adelaide, Adelaide, SA, Australia

^BIndustry & Investment NSW, Armidale NSW, Australia

^CUniversity of New England, Armidale NSW, Australia

Increasing interest in reducing emission of the greenhouse gas methane from ruminants has led to a need for reliable and accurate determination of the daily methane production (DMP) phenotype in ruminants. Twenty-four hour direct calorimetry is generally considered to give an accurate measurement of DMP. However, single measurements, while accurate on the day, does not account for day-to-day intra-animal variability in determination of DMP phenotype. This paper draws on the results of a large body of data (Blaxter and Clapperton, 1965) to estimate the number of measurements needed to discern real differences in the DMP phenotype with varying levels of confidence. Blaxter and Clapperton's (1965) results from 989 individual 24h CH₄ (sheep and cattle) determinations, indicated a day-to-day CV within animals of 7.2%. Using this value we calculated the number of measurements required to detect a varying degrees of difference at different confidence levels from a *t*-distribution.

Figure 1 presents estimates of the number of measures required to detect an expected difference between individual animals at 3 levels of confidence. Increasing the number of DMP measurements will enable the detection of smaller differences in DMP between animals.

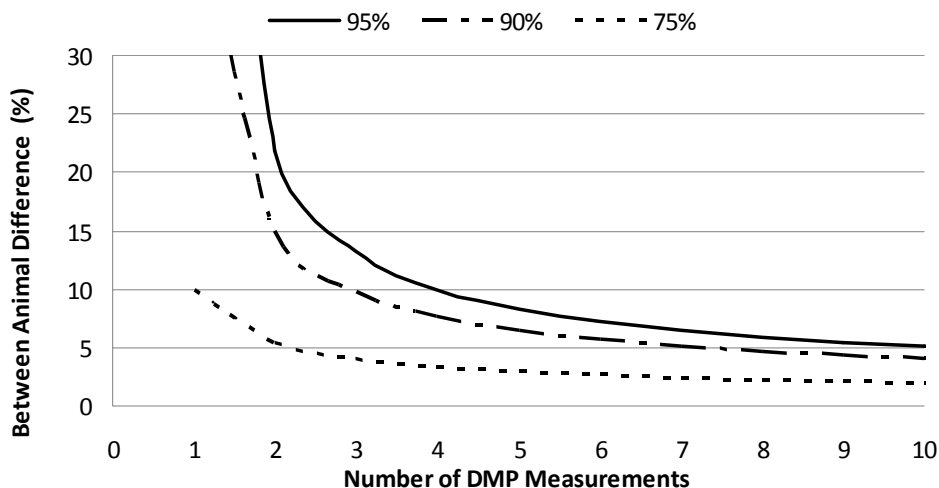


Figure 1. The number of 24h measurements needed (per animal) to detect an expected difference between animals at 95, 90 or 75% confidence intervals

Using a published CV of 7.2, it is clear that single measures of DMP are inadequate to characterise DMPs with a reasonable degree of confidence. We conclude that greater consideration needs to be given as to the number of measures required to adequately discern true differences in DMP phenotype.

Blaxter, K. L. and Clapperton, J. L. (1965). Prediction of the amount of methane produced by ruminants. *Brit. J. Nutr.* **19**, 511.

Email: manofcows@yahoo.com