Determination of the Absolute Accuracy of UK Chamber Facilities used in Measuring Methane Emissions from Livestock

T.D. Gardiner[1], M.D. Coleman[1], F. Innocenti[1], J. Tompkins[1], A. Connor[1], P.C. Garnsworthy[2], J. M. Moorby[3], C.K. Reynolds[4], A. Waterhouse[5], D. Wills[6]

[1]National Physical Laboratory, Hampton Road, Teddington, Middlesex, TW11 0LW, UK

[2]The University of Nottingham, School of Biosciences, Sutton Bonington Campus, Loughborough LE12 5RD, UK.

[3]Institute of Biological, Environmental and Rural Science, Aberystwyth University, Gogerddan, Aberystwyth, SY23 4AD, UK

[4]Centre for Dairy Research, School of Agriculture, Policy, and Development, University of Reading, PO Box 237, Earley Gate, Reading, RG6 6AR, UK

[5]Future Farming Systems, SRUC, West Mains Road, Edinburgh, EH9 3JG, UK

[6]Agri-Food and Biosciences Institute , AFBI Hillsborough, Large park, Hillsborough, Co. Down, BT26 6DR, UK

*Corresponding author. E-mail: tom.gardiner@npl.co.uk, Tel.: +44 (0)208 943 7143

Abstract

Respiration chambers are one of the primary sources of data on methane emissions from livestock. This paper describes the results from a coordinated set of chamber validation experiments which establishes the absolute accuracy of the methane emission rates measured by the chambers, and for the first time provides traceability to international standards, assesses the impact of both sensor and chamber response times on measurement uncertainty and establishes direct comparability between measurements made across different facilities with a wide range of chamber designs. As a result of the validation exercise the estimated