



<b>Title</b>	<b>Using microbiomes to predict methane emissions from cattle</b>
<b>Project Timeframe</b>	May 2018 – Jun 2021
<b>Countries Involved</b>	New Zealand (AgResearch) Ireland (Teagsac, Irish Breeding Federation, University College Dublin) UK (University of Edinburgh, SRUC) Finland (National Resources Institute Finland) France (INRA) Uruguay (INIA) Brazil (UFPA)
<b>Aim</b>	To offer sequencing of microbial composition to GRA member countries in order to: <ul style="list-style-type: none"> <li>• provide a technology to predict and select low methane emitting ruminant systems, which previously was out of reach; and</li> <li>• collate a data set that could be used to develop predictors.</li> </ul>
<b>Research Highlights</b>	<ul style="list-style-type: none"> <li>• Successful sequencing has been carried out in dairy cattle and buffalo.</li> <li>• The Amazonian buffalo showed differences in methanogenic status between animals grazing in the dry and the rainy seasons.</li> <li>• Discussions/collaborations being made across many GRA member countries and the offering of technology to all, removing barriers due to infrastructure (Uruguay, Brazil, Peru, Ireland, New Zealand, Finland).</li> </ul>
<b>Future Work</b>	<ul style="list-style-type: none"> <li>• Attaining a library of international samples and delivering microbial composition results to several member countries.</li> <li>• Currently working with researchers to optimise sampling regimes, collection and transport of samples and the appropriate sample permits for global transport.</li> </ul>
<b>Key Research Output(s)</b>	<u>Conference presentation(s)</u> Hess, M., Zetouni, L., Budel, J., Van Stijn, T.C., Henry, H.M., Kirk, M.R., Brauning, R., McCulloch, A.F., Dodds, K., Hess, A.S., Wood, G., Hickey, S.M., Jonker, A., Johnson, T., Oddy, V., Camara, M., Janssen, P.H., McEwan, J.C., Rowe, S.J. Metagenomics for selection of environmentally friendly ruminants. <i>6<sup>th</sup> International Conference on Quantitative Genetics</i> , Brisbane. 2-12 November 2020.



Hess, M., Zetouni, L., Budel, J., Van Stijn, T.C., Henry, H.M., Kirk, M.R., Brauning, R., McCulloch, A.F., Hess, A.S., Wood, G., Hickey, S.M., Jonker, A., Johnson, T., Oddy, V., Camara, M., Janssen, P.H., McEwan, J.C., Rowe, S.J. Metagenomic profiling of thousands of samples to aid selection of environmentally friendly ruminants. *Plant and Animal Genomes Conference*, San Diego. 11-15 January 2020.

Rowe, S.J., Hess, M.K., Zetouni, L., Hickey, S., Brauning, R., Henry, H., Flay, H., Budel, J., Bryson, B., Janssen, P.H., McEwan, J.C. Breeding low emitting ruminants: Predicting methane from microbes. *International Conference Tropical Agriculture*, Brisbane. 11-13 November 2019.

Hess, M., Rowe, S., Van Stijn, T., Brauning, R., Hess, A., Kirk, M., Kumar, S., Attwood, G., Janssen, P., McEwan, J. High-throughput sequencing of metagenomes for large-scale prediction of quantitative traits. *Gordon Research Conference in Quantitative Genetics*, Barga. 10-15 February 2019.

Rowe, S.J. Drivers of the ruminant engine: forces for change. *Plant and Animal Genomes Conference*, San Diego. 12-16 January 2019.

#### Others including workshops

Melanie Hess presented a project update at the MapNet Conference (Wellington, November 2019).

Melanie Hess presented an update of this work at AAABG (Armidale, October 2019).

Oral presentation by Larissa Zetouni at the MapNet Conference (Dunedin, November 2018), Suzanne Rowe gave an invited talk on how the project fits into the overall global context of using microbiomes at the same meeting.

Results were presented at GGAA (Foz do Iguassu, August 2019), ASGGN workshop and EAAP meeting (Ghent, August 2019), and at the AFBI meeting for food security (Belfast, November 2018).

Larissa Zetouni presented at a workshop on Microbial Communities Research (Palmerston North, October 2018).

A workshop was held with researchers from Queens University (Belfast) and Teagasc (Hillborough) on the project and analyses to date.