

## GLOBAL RUMEN CENSUS – QUESTIONS AND ANSWERS

**There has been a leap forward in research about methane emissions from ruminant animals – the microbes that cause them are similar around the world. The results of the Global Rumen Census have been released in the open-access journal *Scientific Reports*.**

### **What was the main finding of the Global Rumen Census project?**

It found similar bacteria and methanogens dominated in nearly all rumens across the world and only a few species appeared to be responsible for all the methane produced by ruminants everywhere, which means further discoveries in this field could have a global effect.

### **Was that expected?**

The rumen microbes ended up being more similar than expected. Mostly they were the same in all samples, but some microbes were more strongly associated with certain hosts and some with certain diets. With such a large database there can be so many variables such as where the animals are, what they ate and what species they are. The data were explored systematically to figure it out – outside experts with specific skills were used when necessary such as an animal nutritionist and a statistician.

### **How was the project funded?**

The main part of the study was funded by the New Zealand Government via the Ministry for Primary Industries as part of its support for the Global Research Alliance on Agricultural Greenhouse Gases. Collaborators around the world contributed resources to collect and provide samples for analysis and interpretation of results.

### **How many took part in the project and how long did it take?**

140 scientists from 73 organisations contributed to the rumen census alongside six main AgResearch authors, led by Gemma Henderson and Peter Janssen of AgResearch Grasslands. Samples were collected over two years. Initially it was thought there would be about 200 samples but there were more than 900 in the end, due to international interest. Of those, 742 were selected to be included in the project.

### **What kind of samples did the project receive?**

There was a real mixture of samples, including some from the Slovenian mountains and remote islands off the Chilean coast. As well as the expected samples from sheep, cattle, deer and goats, there were also some from buffalo and giraffes.

### **Why was a global rumen census necessary?**

The rumen is the modified foregut of animals known as ruminants. Feed is fermented by the microbes in the rumen, allowing the animal to extract energy from feed such as grasses that otherwise could not be digested. These microbes are therefore essential for ruminant productivity. Unfortunately, one of the by-products of this fermentation is the greenhouse gas, methane. This is produced by microbes called methanogens. The microbial survey involved extracting DNA from all the samples and sequencing diagnostic marker genes that allow the identification of different bacteria and methanogens.

### **What was most interesting from a New Zealand perspective?**

The methane-producing microbes, the methanogens, were the same everywhere. It means the technology that's developed in one place will be applicable everywhere. The same methane-producing microbes are everywhere. New Zealand has a large programme focused on methane-mitigation technology, particularly vaccines or inhibitors that suppress methanogens. Knowing that a locally developed solution is likely to have global applicability is an important motivation for progressing down this path.

### **Why is this important globally?**

Governments and scientists around the world are collaborating to find ways of reducing greenhouse gases while increasing productivity. In the Global Research Alliance on Agricultural Greenhouse Gases, 46 member countries are working together to support agricultural production goals while also reducing greenhouse gas intensity. That is, producing the food the world needs with lower emissions per kilogram of food produced.

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