

DEYSI RUIZ

Bachelor's degree in Animal Science, CONCYTEC Scholarship PhD degree.

I am Deysi Ruiz, a PhD Student in Animal Science, specialising in Animal Nutrition, Lima, Peru. Currently, I'm studying carbon footprint of milk in dairy farms in the Amazon region of Peru. The main objective of my research is to estimate the carbon footprint and to find mitigation options to farms with and without sylvopastoral systems in the tropical region of my country. I am one of the awardees of the CLIFF-GRADS scholarship program 2019, which allowed me to go on a research stay at the National Institute of Agricultural Technology (INTA) in Balcarce, Argentina, between August and December 2019.

INTA is an technology agricultural research institute which is the leader of the agro-technological scenario in research, extension and innovation in Argentina, it develops research and technological innovation actions in value chains, regions and territories to improve competitiveness and sustainable rural development of the country with knowledge in systems of sustainable livestock and expertise in livestock production (especially beef cattle), agricultural sciences, grazing systems and environmental research. The cattle fields and all landscapes are attractive, you can appreciate closely all cattle productions systems and to observe huge areas of land and pastures where animals are grazing, it's incredible! Definitely is a beautiful place for visiting students and researchers from around the world.

The main objective of my research in INTA was to estimate the Carbon Footprint in beef cattle production systems in Central and South of the province of Buenos Aires and identify reduction options. I was directed by PhD. Claudia Faverin and PhD. Sebastián Cambareri. I had to estimate through modelling the carbon footprint of "cow-calf" and "rearing and fattening" systems. I used GLEAM version 2.0 and equations of IPCC, 2006. At first, it was difficult to me because is another reality, so, I had to visit cattle fields with the most representative livestock production of the region. My supervisors guided me and shared many experiences with me, they help me in all the process. I felt very comfortable. I learned about the use of GLEAM, improve my abilities with the guidelines of IPCC, the technique of eddy covariance, the use of information search tools related to Carbon Footprint and concerns related to Livestock and climate change in the region. It made me grow a lot personally and academically. I'm still working on the results, that I hope will be published soon. I think it was a wonderful experience, which I did many friends, interchange knowledge with colleagues, knew people very important related to the area and to learn a lot.

I am very grateful for the opportunity that the CLIFF-GRADS gave me, that was an unforgettable and valuable experience to me. I hope that it scholarship program could also be suitable to postdocs or young researchers in training.

Deysi Ruiz: Closely appreciating the most representative livestock production systems in the southeast and southwest regions of Pampeana in Argentina.



Deysi Ruiz: Visiting farms in Olavarría with my supervisor PhD. Claudia Faverín and the extensionist Paulo Recavarren.



GABRIELA PEREZ

University of Buenos Aires, Faculty of Agronomy, Department of Natural Resources and Environment.

CLIFF GRADS scholarship has been a great opportunity for me. I worked in the project “Understanding the controls of N₂O emissions in grazed upland and lowland systems”, at Bangor University, Wales, UK. My supervisor was Professor David Chadwick.

We performed a field experiment taking N₂O and soil samples for three months. The project aimed to explore the complex interaction between urine volume and N concentration as regulator variables of N₂O emissions in lowland systems.

When I first arrived at Bangor University my supervisor Professor David Chadwick, encouraged me to design my experiment. At first, I felt impressed with all the equipment and resources that were available. During my research stay, I have learnt how to do some new analysis and techniques that I had never done. I have used the Elemental Analyser to measure dissolved carbon and nitrogen for the first time. I have learnt a cheap system for evaluating NH₃ emission from soils with different treatments and how to measure the area of the patch.

Another important issue was the huge interaction between colleagues and that the groups were truly open to collaboration between them. They used to arrange meetings for reading and discussing papers that encouraged opinion and ideas exchange.

My supervisor and all the research group supported me during all my stay. He encouraged me to do new things and he trusted in my abilities.

I can say that my research CLIFF GRAD stay was one of the most incredible experiences of my life, in so many levels. First, at the work level, discovering new technologies, techniques, ways of working, new people, making working networks. At a personal level because it changes yourself, feeling that you are independent and capable to handle a big experiment in other country and a different place of work. Being at Bangor University let me travel, know new people, live a new experience, approach to science in a new different and amazing way.



MARIA CAROLINA SCORCIONE TURCATO

Agronomy Engineer, CONICET/ FAUBA (Buenos Aires University) Scholarship Ph.D. degree, INTA Mafredi

My name is Maria Carolina Scorcione Turcato a PhD Student of Doctorate in Agronomy Sciences. Currently, I'm studying methane emissions from enteric fermentation from ruminants. The aim of my work is to answer the question of whether the use of bioactive compounds from plants that grow in Argentina is able to selectively modulate some populations of ruminal microorganisms to reduce CH₄ emissions evaluated in *in vitro* assays.

I am one of the awardees of the CLIFF-GRADS scholarship program 2019 in which I completed a 5 month research stay in Carillanca Agricultural Research Institute (INIA Carillanca, Temuco, Chile) in the project "Stimulation of metabolic hydrogen sinks alternative to methane in rumen fermentation", directed by PhD. Emilio Ungerfeld. The main objective is to understand the effects of inhibiting the production of methane in the flow of metabolic hydrogen in ruminal fermentation to redirect it towards propionate and other nutritionally beneficial sinks. The focus of the research

is that it has traditionally been hypothesized that methane emissions from ruminants represent an energy inefficiency for the host animal, so that this energy lost can be captured in nutritionally useful metabolic hydrogen sinks for the animal, as well such as the production of propionate and reducing acetogenesis, it would be an opportunity to increase the productivity and profitability of ruminant production. However, thanks to recent publications, it is known that despite theoretical expectations, inhibition of ruminal methanogenesis has not resulted in consistent improvements in the efficiency of milk production or growth and fattening. In this sense, the experiment aims to understand how the intervention of methanogenesis inhibition affects metabolic hydrogen flows in ruminal fermentation, and how changes in metabolic hydrogen sinks are affected by the composition of the ruminal microbial community. The experiment allowed me to train in techniques that I already knew as *in vitro* ruminal fermentations, as well as in techniques that I had not done before and that were a challenge. But artificially selecting microbial communities by sequentially transferred rumen batch cultures according to methane and hydrogen production required a great coordination of techniques and equipments. Other methodologies I learned were the use of stable isotopes (such as $\text{NaH}^{13}\text{CO}_3$ and $(^{15}\text{NH}_4)_2\text{SO}_4$) for the quantification of reductive acetogenesis, the use of gas chromatography to measure gas composition as well as VFA and the elaboration of enriched clarified ruminal fluid (as part of the fermentation medium). Having the possibility of getting involved with the design and implementation of the experiment gave rise to helpful discussions. There were many enriching discussions about methodology and how to carry out the experiment, driving my training as a young researcher.

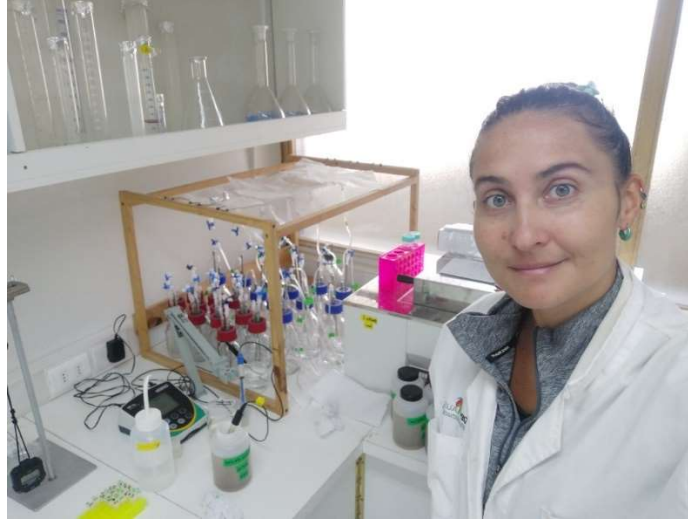
PhD. Emilio Ungefeld was always present and willing to clear doubts, conveys his desire to continue learning, it really was a very good guide in my training.

This experiment is the first in a series, whose results will serve to identify microbial groups as targets for manipulation to direct the flow of metabolic hydrogen, understand their thermodynamic and kinetic control towards the desired sinks and identify and quantify alternative metabolic hydrogen sinks alternative to methanogenesis. The samples we have obtained are still in the process of analysis so there are no results available so far.

Despite having no final results, the internship itself proved to be a unique experience. I have been able to interact with people who are really very kind and willing to teach as well as collaborate in jobs. Knowing new work groups has really helped me to understand the work dynamics that each one has and to be able to somehow fit in, which also meant being able to grow both personally and professionally.

As a PhD student, the opportunity offered by the CLIFF-GRADs scholarships was indeed very helpful, they allowed me to generate collaboration bonds, learn about other realities and approaches on how to approach research on greenhouse gas emissions. In addition, the opportunity to meet other cultures and customs allowed me to have a broader view of reality. Anecdotaly, I have had to live from the beginning a fare hike strike violent unrest and all the disturbances that occurred during October to December in Chile (and that have not yet been resolved) and to understand the economic and social difficulties experienced in the neighboring country. Another great opportunity that the CLIFF-GRADs scholarship program offered me was to attend the 5th Global Science Conference on Climate-Smart Agriculture in Bali. A unique experience from the workshop with the other CLIFF students, the multisensory experience of the conference, to every detail of the Balinese culture. Simply incredible and enriching to know so many nationalities and stories of so many countries.

Ma. Carolina Scorcione: measuring pH and Eh from the last generation of Experiment 1 at the Rumen Laboratory at INIA Carillanca, Chile.



Ma. Carolina Scorcione: collecting ruminal fluid with Emilio Ungerfeld to use as inoculum on the experiments of sequentially transferred rumen batch cultures at INIA Carillanca, Chile.



VÍCTOR ALVARADO

Bachelor's degree in Animal Science, CONCYTEC Scholarship PhD degree

Thanks to CLIFF-GRADS, I was able to complete my internship at the INTA Balcarce in Buenos Aires, Argentina. There I was very kindly received by Dr. Patricia Ricci, who

throughout my stay not only accompanied my learning and research, but also ensured my comfort and safety. I really appreciate her support, as well as the one from other research companions.

The experiment consisted of comparing a modification of the SF₆ tracer gas technique, where the compressed capillary was replaced by a steel ball as a sample flow restrictor of expired gas and with sample collection for five uninterrupted days. These two techniques were also compared with measurements in open circuit respiratory chambers. The treatments were two levels of feed allowance and 2 measurement methods. For this, 4 steers were used in a 4x4 Latin square design, where two animals entered chambers and two steers stayed in pens with the 5-day and 24-hour tubes. The diets consisted of corn, sunflower expeler, fescue hay and mineral salts. These were offered at 90 and 50% of consumption, in order to demonstrate the sensitivity of each method to differentiate a greater or lesser emission of methane depending on consumption. Preliminary results indicate that the 24-hour method and the 5-day collection method do not differ from each other, nor with the camera method. This would indicate an improvement in the technique in terms of investing less time in animal management, less labour, fewer samples to be analysed and less stress or alteration of the consumption pattern of animals.

I want to emphasize that this opportunity has not only improved my skills as a researcher, but also generated new contacts to conduct future research to mitigate climate change. Finally, I think it would be important in the near future to generate similar opportunities to postdocs students who can continue their training as a researcher.



