

Susanna Elisabeth Räisänen

Tenure track Assistant Professor
Department of Animal and Veterinary Science
ANIVET Ruminant nutrition
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Education:

- Doctor of Philosophy in Animal Science, August 2021
The Pennsylvania State University
Supervisor: Alexander N. Hristov
- Master of Science in Animal Science, June 2016
The Swedish University of Agricultural Sciences
- Bachelor of Science in Animal Science, September 2014
The Swedish University of Agricultural Sciences

Employment:

- September 2022 to June 2024 – Postdoctoral Researcher/Study Director/Senior Assistant (Oberassistent)
ETH Zürich, Institute of Agricultural Sciences, Animal Nutrition Group
 - *Overseeing animal experiments within the group and project coordination with AgroVet-Strickhof research team*
 - *Experimental design and animal research license applications*
 - *Co-supervising doctoral and master's students*
 - *Publication of research findings in scientific journals*
 - *Long-term planning of group research directions*
 - *Grant writing and budget planning*
 - *Lecturer in Agricultural Sciences program Bachelor's and Master's level*
 - *Outreach and networking for collaboration within and outside Switzerland*
- August 2021 to August 2022 – Postdoctoral Researcher
University of Helsinki, Department of Agricultural Sciences/Animal Science
 - *Overseeing/managing animal experiments*
 - *Co-supervising doctoral and master's students*
 - *Publication of research findings in scientific journals*
 - *Presenting research in scientific conferences*
 - *Teaching in Agricultural Sciences program Master's level*
- January 2017 to August 2021 – Research Assistant
The Pennsylvania State University, Department of Animal Science
 - *Managing animal experiments*
 - *Training group members in experimental design, laboratory and statistical analysis, and scientific writing*
 - *Publication of research findings in scientific journals*
 - *Presenting research in scientific conferences*

Research experience:

- ETH Zürich (September 2022 to June 2024): Study director for 9 animal experiments and 1 in vitro experiment related to dairy cow nutrition and nutritional physiology, mitigation of greenhouse gas emissions, nitrogen efficiency, and amino acid requirements. Co-author on 4 published peer-reviewed articles, and 4 submitted manuscripts.
- University of Helsinki (August 2021 – August 2022; on-going collaboration): Lead researcher of 3 dairy nutrition experiments and 1 in vitro experiment related to use of legumes in dairy cow diets, and related nitrogen utilization, and mitigation of nitrogen and methane emissions. First author on 2 published peer-reviewed articles and 1 submitted manuscript, co-author on 1 published peer-reviewed article.
- The Pennsylvania State University (January 2017 – August 2021; on-going collaboration): Lead researcher of 7 dairy nutrition experiments and 2 in vitro experiments related to amino acid requirements and metabolism, and assessment of bioavailability of rumen-protected amino acids. Co-leading, training and support on more than 20 additional research projects related to protein and energy feeds for lactating dairy cows, as well as feed additives and feeding strategies to reduce enteric methane emissions from dairy cows. First author on 6 published peer-reviewed articles and co-author on more than 20 publications.

Supervision of junior researchers:

- PhD students:
 - Mario Barrientos Blanco, Institute of Agricultural Sciences, ETH Zürich (Co-supervisor)
 - Rong Peng, Institute of Agricultural Sciences, ETH Zürich (Co-supervisor)
 - Xiaoqi Ma, Institute of Agricultural Sciences, ETH Zürich (Co-supervisor)
 - Md Zakirul Islam, Institute of Agricultural Sciences, ETH Zürich (Co-supervisor)
 - Kai Wang, Institute of Agricultural Sciences, ETH Zürich (Co-supervisor)
 - Olli Pitkänen, Department of Agricultural Sciences, University of Helsinki (Co-supervisor)
- Master's students:
 - Alana Schudel, Institute of Agricultural Sciences, ETH Zürich (Main supervisor)
 - Jussi Väättäinen, Department of Agricultural Sciences, University of Helsinki (Main supervisor)
 - Þorbjörg Helga Sigurdardóttir, Department of Agricultural Sciences, University of Helsinki (Co-supervisor)
 - Tiina Kuivasniemi, Department of Agricultural Sciences, University of Helsinki (Co-supervisor)
 - Laura Havukainen, Department of Agricultural Sciences, University of Helsinki (Co-supervisor)

Teaching activities:

- Lecturer 'Ruminant Science', master's level (Institute of Agricultural Sciences, ETH Zürich)
- Lecturer 'Quality of Products of Animal Origin', bachelor's level (Institute of Agricultural Sciences, ETH Zürich)
- Guest lecturer 'Ruminant Physiology', master's level (Department of Agricultural Sciences, University of Helsinki)
- Teaching assistant 'Principals of Animal Nutrition', undergraduate level (Penn State, College of Agricultural Sciences)
- Completed a course in Teaching and Learning in Agricultural Science (Penn State, College of Agricultural Sciences)

- Organization, planning and delivery of effective college teaching methods, matching/learning styles, evaluation of instruction and learning.

Grants and fellowships:

- 2024, Project Partner: “Improving animal welfare with non-invasive breathomics approach for health assessment of dairy cows”; CHF 397’656. Funded by Swiss National Science Foundation
- 2023, Co-PI: “Mitigation of greenhouse gas emissions and nitrogen excretions from lactating dairy cows through feed additives and optimization of protein nutrition”: CHF 196,736. Funded by Nestle
- 2022, PI/ETH Post-Doctoral Fellowship “Examining the effect of protein-energy interaction on the utilization efficiency of amino acids and nitrogen in pursuit of reduced nitrogen emissions from lactating dairy cows”: CHF 233,900. Awarded by the ETH Fellowship Programs

Major Scientific achievements:

- I conducted a meta-analysis that confirmed histidine as one of the important amino acids for lactating dairy cows. During my doctoral studies I investigated the optimal level of supplemental histidine in dose-response studies, and in relation to the metabolizable protein. Deciphering AA requirements of lactating dairy cows enable lower total dietary protein content, improve nitrogen utilization, and eventually lower costs and mitigate nitrogen emissions on dairy farms. <https://doi.org/10.3168/jds.2022-22966>; <https://doi.org/10.3168/jds.2021-20800>; <https://doi.org/10.3168/jds.2021-20188>; <https://doi.org/10.3168/jds.2021-20189>
- During my time at the Pennsylvania State University, I developed a new method to estimate the bioavailability of rumen-protected amino acids (RPAA), which was further compared to other in vivo methods. The proposed method has a potential to be a robust way for measuring bioavailability, which is a crucial if wide use of RPAA on dairy farms are to be adapted. Use of RPAA would allow for lower dietary protein levels, decreasing the need for resource intensive protein feeds and lead to lower nitrogen emissions from dairy operations. <https://doi.org/10.1016/j.anifeedsci.2020.114595>; <https://doi.org/10.3168/jds.2024-25437>
- I was the first to test the in vivo bioavailability of a potential methionine supplement (N-acetyl-L-Methionine) for lactating cows. In vivo measurements of bioavailability of supplemental AA are crucial for their reliable and meaningful inclusion in dairy cow diets. <https://doi.org/10.3168/jds.2021-20540>.
- I was involved in one of the first experiments investigating the potential use of red seaweed (*Asparagopsis taxiformis*) to mitigate methane emissions from lactating dairy cows. Our work showed the potential for decreases in enteric methane emissions with red seaweed. However, more research is needed to investigate the optimal processing and storage of the seaweed as well as an optimal dose to balance the mitigation potential with adverse effects on feed intake and milk production. <https://doi.org/10.3168/jds.2020-19686>
- I was involved in a study that investigated the potential use of ororumenal tubing, bolus, and saliva sampling techniques as an alternative to rumen cannula sampling to collect rumen fluid from ruminants. These results showed that tubing is suitable when comparing treatments within an experiment for the purpose of studying various rumen fermentation parameters. Both rumination bolus and stomach tube solid samples may serve as proxies for cannula solid samples for RNA-based microbial analysis. <https://doi.org/10.3389/fmicb.2020.618032>; <https://doi.org/10.3168/jdsc.2021-0094>