

## PROJECT TITLE

Identification of hemp volatile organic compounds accounting for the effect on mitigating enteric methane emissions from ruminants

## CONSORTIUM

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# SUMMARY OF THE REPORT

Methane is a potent greenhouse gas, and livestock farming is the biggest contributor to anthropogenic methane emissions. More than 90% originate from digestive processes of plants in ruminants, predominantly cattle and dairy cows. Recently, an essential oil extract from *Cannabis sativa L.* has been identified to diminished CH<sub>4</sub> formation, at least *in vitro*. This effect was assigned to various volatile organic compounds (VOCs). We asked the question if the supplementation of diet with hemp leaves reduce methane production in dairy cows and if so, which hemp VOCs accounts for the anti-methanogenic effect? To approach this aim, a total of 12 cows from the FBN herd were fed a basal diet, which was supplemented for the experiment with either hemp or soya to meet isoenergetic and isonitogenous conditions. Diets were fed in a cross-over design. At the end of each period, cows were transferred into a respiration chamber. Within the respiration chamber, individual feed intake, milk yield, body weight, and methane production were measured. Feed supplements were sampled and rumen fluid gained by oral tubing and sent to the laboratory in Munich. Plant material and rumen fluid were analysed for VOCs by heating the samples at 50°C. VOCs were captured in the headspace and subjected to GC-MS analysis. As a result we found that the VOC profiles of hemp leaves and soybean meal and their respective rumen fluids clearly differ from each other. On the other hand, there was overlap between VOCs from hemp leaves and from rumen fluid of cows fed hemp leaves. Overlaps included typical sesquiterpenes. We are currently evaluating the data by various statistical approaches and aim to publish the outcome soon. At this stage, we gratefully thank the colleagues in Munich, Prof. Schnitzler, his team, and the DPPN.

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