CFAES

SCHOOL OF ENVIRONMENT AND NATURAL RESOURCES

GRADUATE EXIT SEMINAR

ANNA KOLGANOVA

Reducing methane emissions from ruminants

Animal husbandry produces aggravate emission of greenhouse gases, including that of methane (CH4). CH4 is produced as a byproduct of enteric microbial degradation and resulting fermentation in the rumen. The potential of biochar to influence ruminal methanogenesis has been actively discussed. Biochar is able to reduce CH4 emissions from soils. The methanogenesis processes in ruminants and soils are similar; however, the effect of biochar on CH4 production in the rumen remains to be unstudied. In the project, biochar's optimal dosage, its electrochemical properties and chemical profile were analyzed. It was found that biochar has the potential to absorb different anions, including nitrate. The effect of biochar's oxidation state on its nitrate sorption capacity was characterized as well but no association was observed. The effect of biochar on ruminal methanogenesis under the conditions of low forage, high forage, and almond hulls-containing diets is evaluated during an in-vitro experiment with rumen fluid samples taken from Jersey cows. Based on the results, biochar reduces CH4 emissions and the effect can be considered significant. The mechanism can be based on the possible ability of the material to absorb hydrogen, preventing it from reacting with carbon dioxide to produce CH4 in the rumen. Nitrate in the rumen gets broken down to nitrite, which can depress methanogens activity but also is considered toxic when absorbed into the blood system. Since biochar is able to absorb nitrates, the byproduct can provide a direct interaction between methanogens and nitrites, without letting them into the blood system. The combination was tested and the results showed better CH4 production inhibition than when using biochar only. Along with CH4 concentration, such measurements and as VFA production, NDF, pH, N content, NO3/NO2 content, etc. were taken to confirm that the treatments are safe to be used in-vivo.

Advisor: Dr. Rattan Lal

Wednesday, July 5, 2023
1:00 P.M.

Location: Kottman Hall 460

Join the seminar via Zoom:

https://osu.zoom.us/j/98134686411?pwd=VUJEV04xSkgrQTVaM2kzK28yYlVOZz09

Meeting ID: 981 3468 6411 Password: 800790