# Reducing Methane Emissions by Implementing Strategic Hydroponics Into the Bos taurus Diet

Lentz, Ian (School: Camp Hill High School)

Climate change is greatly attributed to an excess of greenhouse gasses trapping heat in the Earth's atmosphere. Livestock digestive function contributes to a portion of these emissions, suggesting that dietary changes could begin to lessen current agricultural methane emissions and human-motivated contribution to climate change. Investigation began with the development of a hydroponics system to grow wheatgrass. Two full-grown Bos taurus, or Belted Galloway cows, were used for experimentation, and one had a diet supplemented with the hydroponically-grown food source. Manure samples from each cow were used for gas production measurements. After hydroponic and gas-measurement procedures were carried out, phase two of research compared the cost, environmental-consciousness, and feasibility of growing hydroponic food sources with standard hay-grass diets. In the end the experimental cow, which was fed hydroponic wheatgrass, produced manure conducive to less gas production than the control cow. The hydroponically grown food source decreased methane production on average by at least 6 kPa per 50g manure. Hydroponic wheatgrass implementation was found to be able to remove 1.36 million metric tons of methane from yearly global emissions. The low initial cost of $20.19 per square meter makes it scalable and accessible to all. The future is bright for hydroponic fodder, as it is applicable to a broader scope of livestock.

**Awards Won:**