CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)

Dillon Szyper; Anthony Toledo

Project Number

31030

Project Title

Reducing Gaseous Emissions in Dairy Cattle Excreta using Lipids

Abstract

Objectives/Goals

Our goal is to reduce the amount of gaseous emissions released by cattle into the atmosphere by adding lipids to their feed and also to their fecsl mstter.

Methods/Materials

In the pilot study the bulls were fed corn silage ad libitum. For the first treatment, ½ liter of vegetable oil was mixed directly into the corn silage daily and fed for 15 days. The fecal matter produced was placed into a 70 ml test tube, filled completely to the rim. The balloon was stretched over the open the end of the test tube until secured. The circumference of the balloon was measured with the tape measure at 1, 6, and 24 hours, and the data was recorded. For the second variable, these steps were repeated adding canola oil to the corn silage and fed. As a control, fecal matter was collected from a bull fed only corn silage with no lipid additive.

In the secondary experiment, the same materials were used with the exception that 250 ml Erlenmeyer flasks replaced the test tubes. For the variable, a 5% mixture of #2 yellow grease and the liquid waste slurry were combined and filled to the rim of the flask. A balloon was then placed over the rim of the flask to collect any gases emitted. As a control, the liquid slurry with no lipid additive was filled to the rim of the flask and a balloon placed over, to collect any released gases.

Results

In the pilot study where lipids were mixed with corn silage and gases were collected from the feces, after 24 hours the vegetable oil variable measured 1.78 cm, the canola oil variable measured 10.16 cm, and the control measured 12.7 cm. The vegetable oil had an overall decrease in emissions of 86% when compared to the control with no lipid additive.

In the secondary experiment lipids were added directly to dairy lagoon waste water. The control had a gas collection measurement of 5.5 cm and the lagoon slurry with lipid additive had a measurement of .85 cm. This experiment resulted in an 85% reduction in gaseous emissions.

Conclusions/Discussion

The findings of this experiment help to demonstrate the potential benefits of lipid additives and that gaseous emissions can be significantly reduced using lipids in the form of vegetable oil and #2 yellow grease. This potential solution to rid waste of harmful gases produced by cattle has positive implications for U.S. dairy producers, agriculture and the environment.

Summary Statement

Reducing harmful gases from dairy cattle waste by adding lipids to their feed and lagoon slurry.

Help Received

Advice and information gathered from some experts who study in this field.