**Calcium Peroxide as Feed Additive: Effects on Gaseous Emissions during Cattle Slurry Storage**

Application:

This work is important to show the environmental effects of Calcium Peroxide, as a cattle feed additive, on the resultant slurry storage.

Introduction:

Livestock production systems, especially manure management lead to environmental issues such as the release of greenhouse gases (GHG) and air pollutants such as ammonia (NH3). Agriculture, specifically livestock production, accounts for over 80% and 60% of the total global NH3 emissions, respectively (Behera *et al.*, 2013). Feeds and feed additives can determine the composition and quantity of manure produced, thereby controlling what enters the manure management chain at the housing, storage or land spreading stages. Feed additives such as seaweeds (Roskam *et al.*, 2022; Alvarez-Hess *et al.*, 2023), linseed oil (Doreau *et al.*, 2018) and Calcium Peroxide (CaO2) (Graham *et al.,* 2022; 2023) have reduced methane when added to cattle diets. Limited studies extend gaseous measurements from feed additives to the manure management stage. The potential of CaO2 for methane mitigation in beef cattle is new and on the rise. This study therefore examined the downstream effects of adding CaO2 in varying quantities and form on ammonia and GHG emissions from resultant cattle manure during long-term storage.

Materials and Methods:

Urine and faeces were collected from the animals during a feeding trial. Briefly, 16 animals were divided into four treatments of varying quantities/forms of Calcium Peroxide (CaO2) (CAP) – Control (CON), CAP Low (1.35% CaO2), CAP High (2.25% CaO2) and CAP High Pellet (2.25% CaO2 with a pelleted coarse ration) of the overall diet. All animals were fed a 60:40 forage to concentrate diet.

The faeces and urine of each treatment were mixed and sieved to form a homogenous slurry in a ratio that produced a dry matter (DM) of 6% (Bourdin *et al.*, 2014). Sub-samples were collected before the experiment for slurry characteristics analysis. 1.6 kg of the mixed slurry was then transferred to a 2 L-capacity urine container for a laboratory-scale incubation in a temperature-controlled growth chamber. The temperature and relative humidity of the chamber were set to 12°C and 76% respectively. Each treatment was replicated five times in a randomised block design. To simulate air movements during manure storage in a slatted shed, 10 holes were drilled into the lids of the 2 L containers.

Ammonia and GHG emissions were sampled three times a week at the start of the experiment and then reduced to twice a week. Ammonia was sampled using a dynamic chamber technique with a photoacoustic gas analyser while the GHG emissions were measured with a static chamber technique as described by (Kavanagh *et al.*, 2019; Connolly *et al.,* 2023). pH and temperature readings were also taken every sampling day.

**Results:**

This experiment is ongoing, early results indicate that CaO2 impact slurry characteristics, GHGs and NH3 emissions from the resultant manure. The final results will be presented at the conference.

**Conclusion:**

This work is ongoing.

References

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