The effect of slurry composition on methane potential emissions from fattening pig slurries: a review of three nutrition assays

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This study reviews the effects of pig slurry composition on the biochemical methane (CH_4) potential (B0), using the information collected in three nutrition assays. A total of 84 animals were used to test the effect of 13 different diets. This included different types and sources of fibre (orange pulp and carob meal, study 1), different sources of protein (soybean meal, sunflower meal and wheat DDGS, study 2) and different inclusion levels of fat and fibre (calcium soap of palm fatty acids distillate and orange pulp, respectively, study 3). Faeces, urine and slurry production and composition were determined, as well as B0 from slurry in an in-vitro assay during 100 days. Potential emissions per animal (CH_4–animal) were also calculated according to the daily excretion of volatile solids (VS). Correlations and multiple linear regression analysis were obtained to explain the factors affecting the emissions. B0 ranged between 256 and 430 g CH_4 per gram of VS and was conditioned by the type of diet. Slurry excretion was affected by diet and originated major variations of potential CH_4 emitted per animal and day (66-144 L CH_4/day). Faeces and slurry pH were positively and strongly correlated with B0 ($r=0.72$ and $r=0.62$, respectively, $p<0.05$). Nitrogen content of faeces was positively correlated with B0 (0.61, $p<0.05$) and CH_4 produced per animal ($r=0.77$, $p<0.01$). No other relevant correlations with effluent characteristics were found. The following significant regression models were obtained: B0 (mL/g VS)= -458+119.4*pH ($R2=0.52$) and CH_4–animal (L/day) = 78.5 – 0.82 * Urine dry matter (g/kg) + 0.39 crude protein in faeces (g/kg) ($R2 = 0.75$). Although no clear relationship was found between effluent composition and potential CH_4 emissions, diet composition was a critical factor. The inclusion of different types of fibre and fat changed potential emission per animal in a two-fold range because of changes in B0 of slurry and the amount of excreta produced.