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INHIBITION OF TOTAL GAS PRODUCTION, HYDROGEN SULFIDE, AND SULFATE-REDUCING BACTERIA FROM IN VITRO STORED SWINE MANURE USING CONDENSED TANNINS

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Management practices from large-scale swine production facilities have resulted in the increased collection and storage of manure for off-season fertilization use. Odor and emissions produced during storage have increased the tension among rural neighbors and among urban and rural residents. Production of these compounds from stored manure is the result of microbial activity of the anaerobic bacteria populations during storage. We have been studying the inhibitory effects of condensed quebracho tannins on in vitro swine manure for reduction of microbial activity and reduced production of gaseous emissions, including the toxic odorant hydrogen sulfide produced by sulfate-reducing bacteria (SRB). Swine manure was collected from a local swine facility, diluted in anaerobic buffer and mixed with 1% w/v fresh feces. This slurry was combined with quebracho tannins and total gas and hydrogen sulfide production was monitored over time. Aliquots were removed periodically for isolation of DNA to measure the SRB populations using quantitative PCR. Addition of tannins reduced overall gas and hydrogen sulfide production by greater than 95% after seven days of treatment, and continued to at least 28 days. SRB population was also significantly decreased by tannin addition. These results indicate that addition of quebracho tannins to stored swine manure may reduce odorous and greenhouse gas emissions.