RESEARCH ABSTRACT

ENVIRONMENT

Title: Quantification of gas and odor emissions from swine wean-finish facilities
NPB# 04-046

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Abstract: A total of 960 pigs (equal barrows and gilts) were used in a 2 x 2 factorial, wean to finish experiment to determine the effects of diet (control, CTL vs. low nutrient excretion, LNE) and manure pit management strategy (deep pit, DP vs. monthly pull plug, PP) on excretion of nutrients and gaseous and particulate emissions. Pigs were housed in a 12 room environmental building, which allows for real-time monitoring of air quality, and quantitative manure collection from 24 pits (2/room). Each room contained 30 barrows (3 pens) and 30 gilts (3 pens), which were split-sex and phase-fed to meet or exceed the nutrient requirements of pigs (NRC, 1998) at different stages of growth. Dietary treatments (CTL and LNE) were maintained throughout the trial. Individual pig weights and pen feed consumption data were collected every two weeks. Four pigs from each pen were scanned ultrasonically for determination of loin eye area and backfat thickness at two months of age and every four weeks thereafter during the study. At the end of the experiment, carcass data was collected at harvest on all pigs. Ammonia, hydrogen sulfide, carbon dioxide, methane, and sulfur dioxide concentrations were recorded every fourth week during the experiment. In addition, odor samples were collected at months 1, 3 and 5 of each wean-finish replicate in this experiment. A dynamic dilution venturi olfactometer was used, with trained panelists, to evaluate air samples for olfactometry.

Throughout most phases of the trial, pigs fed the LNE diet grew faster ($P<0.002$) than CTL fed pigs while consuming less feed, resulting in an improved feed efficiency. Manure pit management strategy had no effect on animal performance, except feed efficiency tended ($P<0.07$) to be improved when pigs were housed in rooms with monthly removal of manure compared to manure accumulated in a deep pit for the entire wean-finish period. Carcass backfat depth was increased ($P<0.001$); % lean was decreased ($P<0.001$) and hot carcass weight was increased ($P<0.003$) in pigs fed the LNE diet compared to the CTL diet. Market weight ultrasound loin eye area was increased ($P<0.004$) in pigs fed the LNE diet compared to the CTL diet. Aerial ammonia concentrations were reduced 14% by feeding the LNE diet ($P<0.001$) and were reduced 6% by removing manure from pits monthly ($P<0.005$). Methane concentrations were reduced 18% with the monthly manure removal strategy ($P<0.001$) compared to deep pit accumulation. Ammonia, hydrogen sulfide, carbon dioxide and methane concentrations varied with different stages of pig growth. Olfactometry measures of odor detection threshold and intensity were not affected by diet or manure management strategies.

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