

ENVIRONMENT

Title: Direct Measurement of Dietary and Management Strategy Impacts on Ammonia Volatilization – NPB #02-013

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Date Received: December 22, 2003

Abstract: Two feeding trials were conducted to quantify the effects of dietary strategies on NH₃ emissions of growing-finishing pigs. In Exp 1, nine growing pigs were fed corn-soybean meal diets fortified with no amino acids (17.4% CP), Lys (17.0% CP), or Lys, Met, Thr, and Trp (14.5% CP). In Exp 2, nine growing pigs were fed the Lys diet with 0, 62.5 or 125 ppm of yucca extract (Alltech®). Two gilts and one barrow were allocated to each of three indirect calorimeters. Four 1-wk feeding periods, with new diets assigned weekly, consisted of a 4-d dietary adjustment followed by 72 h of continuous NH₃ measurement from chamber exhaust. Pigs and feed refusals were weighed, urine and fecal samples collected, and manure pits cleaned after each period. Feed intake (FI) and gain (ADG) were measured each period. Diets, urine, and fecal samples were analyzed for TKN and NH₃-N concentration. In Exp 1 and 2, diet had no effect on FI, ADG, or feed efficiency ($P > 0.05$). In Exp 1, TKN in feces (3.97, 3.93, 3.72%; $P < 0.001$) and urine (1.10, 0.94, 0.93%, $P = 0.04$) decreased with decreasing dietary CP. Fecal NH₃-N decreased with decreasing dietary CP (0.47, 0.47, 0.42%, $P = 0.01$) while urine NH₃-N increased (0.10, 0.10, 0.20%, $P < 0.001$). Weekly NH₃-N emissions were 22.25, 19.22, and 11.85 g (± 8.87 SEM; $P > 0.05$). The fraction of excreted TKN emitted as NH₃ during the week was 1.68, 1.52, and 0.91% (± 0.60 SEM; $P > 0.05$). In Exp 2, there was a significant linear response to increasing yucca content for urine NH₃-N (0.14, 0.13, 0.11%, $P = 0.05$). Fecal TKN (3.59% ± 0.06 SEM), fecal NH₃-N (0.48% ± 0.03 SEM), urine TKN (0.94% ± 0.07 SEM), NH₃-N emissions (12.02 g ± 2.81 SEM) and the fraction of excreted TKN emitted as NH₃ during the week (1.20% ± 0.24 SEM) were not affected by diet ($P > 0.05$). Reducing diet CP and including NH₃-binding agents can be effective in reducing N content of excretions and NH₃ emissions. Less than 2% of excreted N was volatilized as NH₃ during the collection period.

These research results were submitted in fulfillment of checkoff funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer reviewed

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