

Effect of Crude Protein Level and Fiber Sources on Nitrogen Excretion Patterns in Grower Pigs

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The objective of the experiment was to study the effect of crude protein (CP) and fiber sources on nitrogen (N) excretion. Two levels of CP (high, 18.5%; and low, 15.6%) and three sources of fiber (control, soybean hulls (SH; 15%), and sugar beet pulp (SBP; 20%)) were tested. Diets were formulated to 3.3 Mcal DE/kg and 2.4 g Dlys/Mcal, supplemented with lysine, methionine, tryptophan, threonine, isoleucine and valine to maintain a similar content of digestible amino acids. Pigs (30.5±3kg) were housed in confinement-type metabolism crates for 26 days. From day 18 pigs had free access to feed. Feces and urine were collected from day 23 to 26.

Voluntary feed intake and body weight gain were not affected by dietary treatments ($P>0.10$). For the fiber comparisons, fecal N increased 14% for SH and 41% for SBP diets compared to control diets (12.4 and 15.4 vs. 10.9 g/d; $P<0.05$). Urinary N decreased 37% for SH and SBP compared to control diets (13.8 vs. 22 g/d; $P<0.01$). For the protein level comparison, urinary N excretion was 36% higher for high CP compared to low CP diets (19.1 vs. 14 g/d; $P<0.05$). Retention of N decreased 15% for SH and 9% SBP compared to control (26.8 and 28.6 vs. 31.4 g/d; $P<0.05$).

When N excretion patterns were expressed as a percentage of N intake, urinary N excretion was reduced 24% for SH and 30% for SBP compared to control ($P<0.01$). Fecal N excretion was increased 33% for SH and 55% for SBP compared to control ($P<0.01$). Fecal N excretion was 12.7% lower for the high CP diets compared to low CP diets (20.7 vs. 23.7%; $P<0.01$). Percentage urinary N excretion was 22.5% higher for high protein diets compared to low protein diets (30.5 vs. 24.9%; $P<0.05$).

Implications: Nitrogen is a nutrient of major concern because of its impact on inside and outside barn environment. Reduction of CP is effective to reduce N excretion especially urinary N. Use of fiber sources high in fermentable carbohydrates can shift N excretion from urine (urea N) to feces (protein-bound N), thereby reducing chances of ammonia emission.