

# Growth performance and nutrient balance of pigs fed low protein diets without mineral phosphate supplementation

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To combat issues of nitrogen (N) and phosphorous (P) runoff and reliance on imported protein feed sources and mineral phosphate (MP) in Swiss pig production, a feeding experiment on growing-finishing pigs was conducted.

The 48 pigs were blocked by gender, body weight (BW), and litter, assigned to 1 of the 4 treatments (C=control, N=low crude protein (CP) with amino acid (AA) addition, P=no MP, and N-P=combination of N- and P-), **fed ad libitum, and all housed in one pen. Grower and finisher diets with C contained respectively 15.5% and 13.5% CP, 0.47% and 0.41% P, and 0.29% and 0.26% digestible P (dP)**, diets with N- contained 10% and 15% less CP, and diets with P- contained 20% and 22% less P, leading to 24% and 21% less dP than C. Diets with N- were optimized to use minimal amounts of imported soybean meal, replaced by Swiss-origin protein beans and rapeseed meal, and synthetic AAs to reach minimal CP but equal digestible AA contents as in C. In P-, phosphate was removed and calcium:dP ratios were fixed as in C by adjusting calcium carbonate.

Individual feed intake and weekly BW were recorded. Average daily feed intake and gain, and feed conversion ratio (FCR) were calculated. Over grower and finisher phases (**47±4.0d and 40±8.2d, respectively**), nutrient balance data were derived by differences between nutrient intake and body nutrient accretion which was derived from body composition assessment by dual X-ray absorptiometry at the start (22.3±3.35kg BW), middle (≈60kg BW at diet change from grower to finisher), and end (BW≥100kg) of the experiment. **Urinary and daily fecal samples were obtained during two 4-d collection periods (40-50kg BW grower and 75-85kg BW finisher).**

There were no interactions ( $P>0.05$ ) between N- and P- effects on any measured parameter. No differences ( $P>0.10$ ) were observed in growth performance due to N- or P- effects, except finisher pigs with P- had a higher FCR ( $P<0.05$ , 2.66 vs 2.60). In grower, finisher, and overall periods, the intake and excretion of N and P were reduced ( $P<0.01$ ) in pigs fed respectively diets N- and P-, **and female pigs had better nutrient utilization rates ( $P\leq 0.001$ ) regardless of treatments.**

The findings suggest replacing imported soybean meal with local protein sources and AA supplementation while simultaneously reducing CP contents and the MP removal in growing-finishing pig's diet can maintain animal growth and reduce N and P excretion into the environment.