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134 Effects of Former Food Products Inclusion on Nitrogen Balance and Nutrient Digestibility in Growing–finishing Pigs. Giuseppe Bee¹,

Roxana Elena Amarie², Marjeta Čandek-Potokar³,
¹Agroscope, ²University of Pisa, ³Agricultural Institute of Slovenia

Abstract: A metabolic trial was conducted to quantify the nitrogen (N) balance, the apparent total tract digestibility (ATTD) of nutrients, and the water consumption of growing-finishing pigs that were fed diets containing graded levels of former food products (FFPs). Twenty-four pigs were housed individually in metabolic crates and given ad libitum access to isonitrogenous, isoenergetic diets that were formulated with 0%, 20%, or 40% FFPs (as a replacement for conventional cereals). Each animal provided repeated measurements over two six-day collection periods, which occurred at the end of the grower (approximately 60 kg BW) and finisher (approximately 100 kg BW) phases. Daily feed and water intake was recorded. Total feces and urine were quantified each day, and samples were pooled for chemical analyses within each pig across the six-day period. Nitrogen concentration was determined in the diets, feces and urine to calculate N intake, fecal and urinary N excretion, N retention (by difference), and N use efficiency (N retained/N intake). In the feces, gross energy and phosphorus were analyzed to estimate the ATTD of energy and phosphorus alongside N. During the grower phase, the inclusion of FFP (0–40%) did not affect feed or water intake; however, it altered N partitioning. Fecal N excretion increased linearly by 34% and 62% at 20% and 40% FFP, respectively ($P < 0.01$), while urinary N excretion decreased linearly by 20% and 30% ($P < 0.05$). These shifts yielded similar N retention and overall N efficiency across treatments. Consistent with the fecal N response, ATTD of N as well as energy, and phosphorus ATTD decreased linearly with increasing FFP ($P < 0.01$). Maximal reductions were 12%, 6%, and 12% for N, energy, and phosphorus, respectively, indicating diminished nutrient availability at higher inclusion levels. During the finisher phase, increasing FFP had no detectable effect on N intake or urinary N losses but linearly increased fecal N excretion by up to 34% ($P < 0.02$). Water intake increased markedly with FFP during the finisher phase, by as much as 60% ($P < 0.01$). As in growers, ATTD coefficients for N, energy, and phosphorus decreased linearly with increasing FFP inclusion ($P < 0.001$), with maximum reductions of 5%, 5%, and 12%, respectively. In summary, partially substituting cereals with FFPs did not reduce feed intake but was associated with lower ATTD of N, energy, and phosphorus.

The shift from urinary to faecal N excretion is environmentally favourable because urinary urea rapidly hydrolyses to total ammoniacal nitrogen (TAN, $\text{NH}_4^+ + \text{NH}_3$), which increases the risk of ammonia volatilisation. In contrast, faecal N contains little urea and requires microbial proteolysis and deamination to generate TAN, resulting in slower formation and a smaller pool of volatilised N during housing and storage. Funding: EU H2020—PIGWEB (Grant Agreement No. 101004770).

Keywords: ammonia volatilization, upcycled feed, urinary–fecal N shift.