

# Digestibility and nutritional value of whey co-products for weanling pigs

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New research from the University of Illinois sheds light on the nutritional value of whey powder and whey permeate as a lactose source for pigs.

"We wanted to determine the energy concentration and digestibility of phosphorus in whey powder, in conventional whey permeate, and in low-ash whey permeate because these values had not been determined," said Hans H. Stein, a U of I professor of [animal sciences](#).

Skim [milk powder](#) has been used to meet the requirement for [lactose](#) by weanling pigs, but it is costly and usually uneconomical to use in commercial production. Whey powder, a co-product of the cheese industry, contains lactose and [protein](#) and is more economical to use in weanling pig diets, he said.

"Some companies take the protein out of whey powder because they sell it for the human [food market](#)," Stein explained. "When they take the protein out, they are left with whey permeate, which contains mainly lactose and [ash](#)."

In their study, the scientists used conventional whey powder—66 percent lactose, 13.2 percent crude protein, and 15.8 percent ash—and two permeate products. One of the permeates was a conventional whey permeate that contained approximately 76 percent lactose and 9 percent ash. Most of the ash had been removed from the other permeate product, which was approximately 89 percent lactose and only 1.7 percent ash.

The concentration of metabolizable energy and the standardized total tract digestibility of phosphorus were determined in all three ingredients using weanling pigs. Results indicated that the conventional whey permeate contains less metabolizable energy than whey powder (3,081 vs. 3,462 kcal per kg DM). However, the low-ash whey permeate contained 3,593 kcal metabolizable energy per kg DM.

"Removal of protein from whey powder resulted in a reduced concentration of metabolizable energy in the whey permeate. If ash is also removed, the resulting high-lactose, low-ash whey permeate has a concentration of metabolizable energy that is slightly greater than that in whey powder," Stein said.

The concentration of phosphorus in whey powder, conventional whey permeate, and low-ash whey permeate was 0.63, 0.57, and 0.10 percent, respectively, but the standardized total tract digestibility of phosphorus was not different among the three ingredients (91.2, 93.1, and 91.8 percent, respectively).

"These data clearly indicate that phosphorus from all three ingredients is well digested by weanling pigs," he said.

Stein said that these results make it possible to include whey powder, whey permeate, or low-ash whey permeate in diets for weanling pigs that are formulated on the basis of metabolizable energy and the standardized total tract digestibility of [phosphorus](#).

"These data will provide the feed industry and swine producers with more options for including lactose in the diets," he said.

The study was published in a recent issue of the *Journal of Animal Science*. Co-authors are Jung Wook Lee of the U of I and Beob Kim of Konkuk University in Seoul, South Korea. Funding was provided by

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