Adding microbial xylanase to diets containing rice bran increases energy value for pigs

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Research at the University of Illinois is finding ways to make rice bran, an abundant co-product of the production of white rice for human consumption, more efficient as a feed ingredient for pigs.

There are 70 to 100 million tons of rice bran produced every year worldwide, but due to its carbohydrate composition, about a quarter of the energy in rice bran is unavailable to pigs. Dr. Hans H. Stein, professor of animal sciences at the University of Illinois, along with graduate student Gloria Casas, hypothesized that an enzyme called xylanase might increase concentrations of digestible energy (DE) and metabolizable energy (ME) in rice co-products.

"The first step in the processing of rice is to remove the hulls, which has no nutritional value," says Stein. "The brown high-fiber layer that is located under the hulls is also removed to produce white polished rice for human consumption. This layer is called rice bran and has high concentrations of non-starch polysaccharides, particularly arabinoxylans. Therefore, we hypothesized that the arabinoxylans in rice bran could be made more fermentable by adding the enzyme xylanase to the diet."

To do so, Casas and Stein fed diets containing four different rice co-products to weanling barrows. They used both full fat rice bran and defatted rice bran. For comparison, they also fed brown rice, which is rice with the bran still intact, and broken rice, which consists of

fragments of white rice that are too small for commercial sale. Each rice co-product was fed in two different diets: one without added xylanase and one with xylanase.

The results confirmed their hypothesis. The concentrations of DE and ME in full fat rice bran increased from 3,984 kcal/kg and 3,856 kcal/kg in the diets without added xylanase to 4,311 kcal/kg and 4,198 kcal/kg in the diets with added xylanase. Similarly, addition of xylanase to the diets increased the ME in defatted rice bran from 2,936 kcal/kg to 3,225 kcal/kg, but DE was not changed.

"Full fat rice bran and defatted rice bran had the greatest concentration of arabinoxylans and adding xylanase to the diets containing these co-products increased the concentrations of DE and ME," says Stein. However, addition of xylanase did not affect the amount of DE and ME in brown rice and broken rice, which contain more starch and much less non-starch polysaccharides.

Broken rice contained more DE and ME than either full fat rice bran or defatted rice bran if no xylanase was added to the diets, and brown rice also contained more DE and ME than defatted rice bran. However, if xylanase was added, the concentrations of DE and ME in full fat rice bran were not different from values in brown rice or broken rice.

Stein says that these results demonstrate a way to efficiently utilize resources that might otherwise go to waste. "Adding xylanase to diets containing full fat rice bran increased its energy digestibility from 75 percent to 80 percent, which made it equivalent in energy value to brown rice or broken rice. This offers producers another option for making use of co-products in swine diets."

More information: The paper, "Effects of microbial xylanase on digestibility of dry matter, organic matter, neutral detergent fiber, and

energy and the concentrations of digestible and metabolizable energy in rice co-products fed to weanling pigs," was published in the May 2016 issue of the *Journal of Animal Science*. The full text can be found online at www.animalsciencepublications. … s/articles/94/5/1933

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