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## NONRUMINANT NUTRITION: EXOGENOUS ENZYMES

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### 120 Effects of phytase on phosphorus digestibility of rice co-products fed to growing pigs.

G. A. Casas\*, H. H. Stein, *University of Illinois  
at Urbana-Champaign, Urbana.*

The objectives of this experiment were to determine the apparent total tract digestibility (ATTD) and the standardized total tract digestibility (STTD) of P, and the effect of microbial phytase on ATTD and STTD of P in full fat rice bran (FFRB), defatted rice bran (DFRB), brown rice, broken rice, and rice mill feed when fed to pigs. Ninety-six barrows (initial BW  $19.4 \pm 1.4$  kg) were allotted to 12 diets, with 8 replicate pigs per diet in a randomized complete block design. A basal diet based on corn and soybean meal was formulated, and 5 diets were formulated by adding each of the 5 rice co-products to the basal diet. Six additional diets that were similar to the initial 6 diets, with the exception that 500 units of microbial phytase (Optiphos; Enzyvia, Sheridan, IN) were included were also formulate. The ATTD of P was calculated for each diet using the direct procedure. The STTD of P was calculated for each diet by correcting the ATTD of P for the endogenous P losses. The ATTD and STTD of P in each rice co-product were calculated using the difference procedure. The concentration of P in feces was reduced ( $P < 0.05$ ) from pigs fed diets containing microbial phytase compared with pigs fed diets without phytase. The total daily P output in feces from pigs fed diets with phytase was also less ( $P < 0.05$ ) than in feces from pigs fed diets without microbial phytase, except for diets containing broken rice. Among the rice co-products, the greatest ( $P < 0.05$ ) ATTD and STTD of P were observed for broken rice regardless of inclusion of phytase. The ATTD of P was greater ( $P < 0.05$ ) for all ingredients except DFRB if microbial phytase was used than if no microbial phytase was used, and the STTD of P in brown rice, FFRB, rice mill feed was also greater ( $P < 0.05$ ) if microbial phytase was used than if no microbial phytase was used. In conclusion, the STTD of

**Table 121. Effect of phytase on apparent total tract digestibility (ATTD), and standardized total tract digestibility (STTD) of P in corn, soybean meal (SBM), and full fat rice bran.<sup>1</sup>**

Item	Corn				SBM				Full fat rice bran			
	Phytase, FTU/kg		SEM	<i>P</i> -value	Phytase, FTU/kg		SEM	<i>P</i> -value	Phytase, FTU/kg		SEM	<i>P</i> -value
	0	500			0	500			0	500		
ATTD of P, %	47	66	4	0.005	38	68	8	0.018	47	62	4	0.012
Basal EPL, mg/d	136	147	10	0.478	149	134	4	0.030	159	159	9	0.994
STTD of P, %	53	73	4	0.004	46	73	8	0.035	50	64	4	0.015

<sup>1</sup>FTU, phytase units.

**Table 122.**

	HiP0	HiP1	HiP2	HiP3	HiInP	SE	<i>P</i> -value
ADG, kg							Treatment
Phase 2	0.43 <sup>a</sup>	0.51 <sup>b</sup>	0.50 <sup>b</sup>	0.54 <sup>b</sup>	0.51 <sup>b</sup>	0.01	<0.01
Phase 3	0.64 <sup>c</sup>	0.59 <sup>ab</sup>	0.68 <sup>d</sup>	0.62 <sup>bc</sup>	0.57 <sup>a</sup>	0.02	<0.01
Overall	0.43 <sup>a</sup>	0.44 <sup>a</sup>	0.48 <sup>b</sup>	0.47 <sup>b</sup>	0.43 <sup>a</sup>	0.01	<0.01
ADFI, kg							
Phase 2	0.56 <sup>a</sup>	0.62 <sup>b</sup>	0.62 <sup>b</sup>	0.63 <sup>b</sup>	0.62 <sup>b</sup>	0.02	<0.03
Feed Efficiency							
Phase 2	0.77 <sup>a</sup>	0.82 <sup>b</sup>	0.81 <sup>ab</sup>	0.87 <sup>c</sup>	0.82 <sup>b</sup>	0.02	<0.01
Overall	0.68 <sup>a</sup>	0.69 <sup>ab</sup>	0.72 <sup>bc</sup>	0.73 <sup>c</sup>	0.70 <sup>abc</sup>	0.01	<0.03

<sup>a,b,c</sup>Means within row with different superscript differ (*P* < 0.05).

P is greater in broken rice than in all other rice co-products. The STTD of P in brown rice, FFRB, DFRB, and rice mill feed is relatively low due to the high concentration of phytate in these ingredients, but addition of microbial phytase will increase the STTD of P in most rice co-products.

**Key Words:** phosphorus digestibility, phytase, pig